INSIDE: HOW ANIMALS VANISH

Montana Outdoors

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JULY–AUGUST 2014

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MONTANA'S STRANGEST PLANT?

WHY BEAR SPRAY IS THE BEST DEFENSE

MOUNTAIN GOATS: TOO GRUFF FOR BIGHORN SHEEP?

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Tom Dickson, Editor
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Montana Outdoors

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WELL ARMED
A hiker carries readily accessible bear pepper spray while in grizzly habitat in northwestern Montana. Learn about the spray's effectiveness on page 28. Photo by Donald M. Jones.

FRONT COVER
Rock climbing in the Cabinet Mountains Wilderness Area. More wilderness photos begin on page 20. Photo by Steven Gnam.

Catch 'em in the act

I read with interest and sorrow the article on illegally introducing fish into Montana's waters ("Problems by the Bucketful," May-June). People who do this should receive strict punishment, including jail time and fines equal to the cost of correcting the situation, similar to the fines for people who cause forest fires. I doubt if even a $10,000 fine would cover the costs of eradicating an illegal fish plant. I would urge anyone who witnesses this activity to report it immediately and try to take photos of the illegal action if possible. Many people now have smartphones, so snapping a photo is easy. Illegal fish introductions cost FWP time and money, ultimately leading to higher fishing license fees.

Ron Fick
Dillon

How to help?

In the March-April "Our Point of View" column, FWP director Jeff Hagener noted that some landowners would like hunters to help with fencing, branding, and other ranch chores. I'm interested in helping out, but how can I and others do that if we don't have the names of landowners who are really interested? Could FWP provide a list of landowners? Locations? Approximate dates?

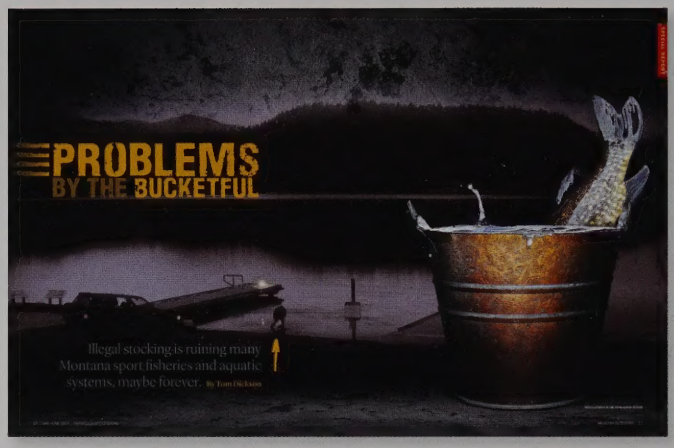
Larry Frideres
Helena

Alan Charles, FWP landowner-sportsman relations coordinator, responds: FWP has no established list of landowners looking for help, but they are definitely out there. As a first step, interested hunters should contact the regional hunting access coordinator, local game warden, or local biologist in the area where they hunt. Those FWP staff may know, for example, of a landowner who was provided with stackyard materials through our Game Damage Program. The department provides wood or plastic fencing that the landowner then uses to protect stored hay crops. Some landowners could use a willing hunter or two to help wrap the stackyard. The FWP folks might also know of habitat projects in need of an extra hand or two.

Local sportsmen's groups and chapters of Pheasants Forever, the Rocky Mountain Elk Foundation, and similar organizations are other places to check.

Hunters might also let local members of the Montana Stockgrowers Association, Farm Bureau, Farmers Union, Grain Growers Association, or Wool Growers Association know they are willing to help landowners who provide public hunting access. Or they could talk to any landowner in the area they hunt, whether the property is in Block Management or not.

For examples of sportsmen's groups and others who have worked with landowners on ranch appreciation days, check out the article "Mending Fences" in the November-December 2008 issue, available online at fwp.mt.gov/mtoutdoors.


PROBLEMS
BY THE BUCKETFUL
Illegal stocking is ruining many Montana sport fisheries and aquatic systems, maybe forever.

Landowners hunt, too

In regard to Jeff Hagener's editorial in the March-April issue on the need to improve relationships between landowners and sportsmen, I contend that the two groups are often not mutually exclusive. Some private lands are closed to hunting, but I know many landowners who hunt or have a close-knit group of family and friends that hunts. That's a study I'd like to see, broken down by hunting district: What percentage of private land is locked down by leases or, instead, hunted by owners? I have been fortunate to know people generous enough to provide access. My offers to fix fences or move cows have been politely declined. (I suspect that my help would be more of a hindrance.) I don't envy the Fish and Wildlife Commission as it tries to balance hunter and landowner satisfaction, as well as figure out how to raise revenue while Montana is competing with other western states for nonresident big game hunters. For my sake and the sake of my sons, I hope the commission is successful.

Jim Gleason
Dillon

Poisonous policy?

Thank you for your article "Weighing in on Wolves" in the March-April issue. We appreciate your balanced coverage of what can be such a controversial species. In the article you stated, "FWP opposes poison." To clarify, does FWP oppose poisoning just wolves, or does FWP oppose poisoning other wildlife in Montana as well? Hopefully it's the latter.

Regardless, it is important for Montanans to understand that the poisoning of wolves and other wildlife occurs on a regular basis in our state. Wildlife Services, an agency of the U.S. Department of Agriculture, poisons thousands of animals in Montana each year. It uses spring-loaded cyanide capsules called "M-44s" to kill predators, carbon monoxide gas cartridges to kill coyote and fox pups in their dens, avicides to kill birds, and rodenticides to kill ground squirrels and marmots. In 2012 alone, Wildlife Services used poison to kill 827 coyotes, 42 red foxes, 25 ravens, 20 marmots, and two wolves.

Both wolves were killed unintentionally—but that is the nature of poison. It is indiscriminate. Poisons kill hundreds of "nontarget" animals across the country each year, including badgers, bears, foxes, birds, and even people's pets. Further, ingestion of these poisoned animals can sometimes lead to secondary poisoning of predators and scavengers.

We applaud FWP's opposition to poison in wolf management, hope that its attitude extends to other native species, and encourage FWP and the public to urge Wildlife Services to seek alternative solutions to resolving conflicts with wildlife in Montana.

Zack Strong
Natural Resources Defense Council
Bozeman

Correction

The Blue Lake on the back cover of the May-June issue is not the one north of Big Timber, as the caption said. It's the one in the Flathead Valley just northeast of Echo Lake, between Big Fork and Creston, one of a series of pothole lakes that run along the east side of the valley.

Crab-stuffed morel mushrooms

By Tom Dickson | Preparation Time: **15 min.** | Cooking Time: **20 min.** | Serves: **8–10** (as appetizers) or **4** (as dinner)

PHOTO COURTESY OF DAVID EGER, EARTHYDELIGHTSBLOG.COM

This year is shaping up to be a great one for morel picking. Higher-than-average snowfall this past winter moistened soil enough to encourage yellow morels to start popping up in mid- to late May along many river bottoms, cottonwood forests, and other wet, low-lying areas across the state. The emergence of these delectable mushrooms was about two weeks later than usual, owing to chilly temperatures in early spring.

Starting in about mid-June, morel hunters began heading to the sites of many 2013 fires, looking for black morels poking up through the charred duff. Harvest begins at lower elevations and along south- and west-facing slopes and continues well into summer up burned mountainsides along east- and north-facing slopes and wetter areas.

Most big fires last year were deep in the Bitterroot National Forest along the Idaho border and in other forests far from roads. It could be a challenge accessing many of those burned areas.

New to morel hunting? The best way to locate and identify these tasty fungi is to befriend an experienced mushroomer at work, church, the gym, or elsewhere (though even a big-hearted morel hunter will not reveal secret spots that may have taken years to locate). Also, check out the Western Montana Mycological Association website, fungaljungal.org, which is packed with great information.

If you've never tried morels before, eat just a few in the first meal to see how you react. Also, some people have experienced bad stomach reactions when combining cooked morels with alcoholic beverages. Morels should always be well-cooked and never consumed raw.

If luck, experience, or perseverance leads you to a patch of larger specimens, try this recipe for crab-stuffed morels. They make great appetizers for parties or a tasty summer supper when served with a hearty salad.

—Tom Dickson is editor of Montana Outdoors.

This recipe is based on one created by David Eger of Earthy Delights, a food purveyor in Michigan. I like that it uses halved rather than whole morels, allowing you to serve more delicious crab stuffing in each mushroom.

INGREDIENTS

20 medium or large morel halves
½ c. crab meat*
1½ c. bread crumbs
2 small or 1 large celery ribs, finely chopped
1 small onion, finely diced
4 T. grated Parmesan cheese
1 T. fresh thyme leaves or 1 t. dried thyme leaves
Zest of 1 lemon
1 egg beaten with 1 t. water
Hot sauce (Louisiana or Srirachi), 4 dashes or to taste
Salt and pepper
1-2 T. fortified wine (optional)
1 T. butter, melted

* Finding fresh crab meat—sweet, tender, with a touch of salinity—in land-locked Montana is not easy. The best substitute is refrigerated lump or jumbo lump meat. Most canned crab meat is mushy or fibrous. The best refrigerated meat, according to the testers at *Cooks Illustrated*, is Phillips Premium Jumbo Crab. If you can find only canned, go with Miller's Select, say the *CI* testers.

DIRECTIONS: Preheat oven to 350 degrees. In a large bowl, combine the crab meat, bread crumbs, chopped celery, diced onion, Parmesan cheese, and thyme. Using a microplane grater or zester, finely grate the peel of one lemon and add it to the mixture. Beat the egg with the water and stir into the mixture. Add the hot sauce, and salt and pepper to taste. The crab meat mixture should be just moist enough to cling together when gently pressed into a spoon. If it seems too dry, mix in 1 to 2 T. of water or fortified wine (port, madeira, or sherry).

Lightly brush the bottom of each morel half with melted butter and lay on a baking sheet. Firmly press a spoonful of the crab meat mixture into the cavity of each morel half, mounding it up above the mushroom's edge. Bake the crab-filled morel halves for about 20 minutes, or until the tops are golden brown and the mushrooms are cooked through and tender. For decoration, top each stuffed morel before serving with a small piece of baked crab meat and a thyme sprig (see photo). Eat immediately.

The public's voice in FWP affairs

After spending nearly a decade as director of this department, I continue to be surprised that many Montanans don't know why the Fish and Wildlife Commission exists and what it does.

The five-member commission—previously the Fish, Wildlife & Parks Commission until, in 2013, a separate Parks Board was established to oversee state parks—is an *independent* citizen board. Appointed by the governor to provide public oversight of FWP activities, the commission is its own separate entity. FWP does the day-to-day work of managing Montana's fish and wildlife. The five commissioners, who represent the Montana public, make the final decisions on regulations, property acquisitions, and major rules and projects recommended to them by FWP staff.

To be appointed, candidates for the Fish and Wildlife Commission must have a proven interest in fish and wildlife management and recreation. They are often dedicated hunters, or anglers, or both, and come from all walks of life. Past commissioners have worked as outfitters, attorneys, university professors, loggers, business owners, farmers, and advertising executives, to name just some of the professions. By state statute, at least one member of the commission "must be experienced in the breeding or management of livestock."

The citizens of this state feel passionately about fish and wildlife management and conservation. They want and deserve a strong voice in managing those resources.

Fish and Wildlife Commission members listen to public comment during a meeting on the 2012-13 Montana wolf hunting season.

Because commissioners represent the public, they are lobbied with e-mails, letters, and phone calls from Montanans across the state. At every monthly meeting, the commissioners are aware of public opinion on the issues before them that day.

Though commission appointments are to be made without regard to political affiliation, most—though not all—commissioners appointed by Republican governors are Republicans and most—though not all—commissioners appointed by Democrat governors are Democrats. To lessen political influence, state law requires that a new governor appoint only three members of the commission, allowing two to remain from the previous administration. After two years, the governor may replace those two with two new members of his or her choosing. The commissioners' staggered four-year terms provide for a healthy mix of political affiliation and perspective.

Each member is selected from one of five geographical districts of Montana. Though commissioners are supposed to consider the entire state when making decisions, I've found that each member's background and residence influences his or her thought process to some extent. That's a good thing. It ensures that interests in all regions of the state are represented.

As FWP director, I have responsibilities to both the department and the commission. I serve at the pleasure of the governor and am in charge of managing this agency. At the same time, I must answer to the Fish and Wildlife Commission. I'm not a voting member of the commission, but I act as commission secretary at meetings. My role is to be the primary liaison between commission members and FWP, often clarifying for the commission points made by department staff.

The commission and FWP employees often see eye to eye, but certainly not always. For instance, biologists may propose a new hunting regulation based on sound biology, as they should. Yet the commission may not approve the change because members don't believe it would be in the public's best interests. Commissioners vote on recommendations made by FWP senior managers, and a majority rules.

Many states have fish and wildlife commissions similar to Montana's. But some don't. The conservation agencies in those states can make decisions and then, after public review and comment, decide for themselves what to do. That likely makes life easier for the agency and its staff, but it wouldn't be a good system here in Montana.

The citizens of this state feel passionately about fish and wildlife management and conservation. They want and deserve a strong voice in managing those resources. The Fish and Wildlife Commission exists to provide that input. What's more, speaking out at monthly commission meetings is one of the most direct ways any Montanan can be part of the process of setting hunting and fishing seasons, acquiring conservation easements, and conducting other department activities—especially now that we offer video access to commission meetings at all our regional offices.

Despite strong differences of opinion among some Montanans over how the state's fish and wildlife should be managed, there continues to be statewide consensus for the conservation and stewardship of those resources. Credit for Montana's conservation ethic goes in large part to the Fish and Wildlife Commission and its essential role in giving Montanans an even greater say in how their fish and wildlife should be managed.

—**M. Jeff Hagener,** *Montana Fish, Wildlife & Parks Director*

DAN BOYCE, MONTANA PUBLIC RADIO

Tom Reichner

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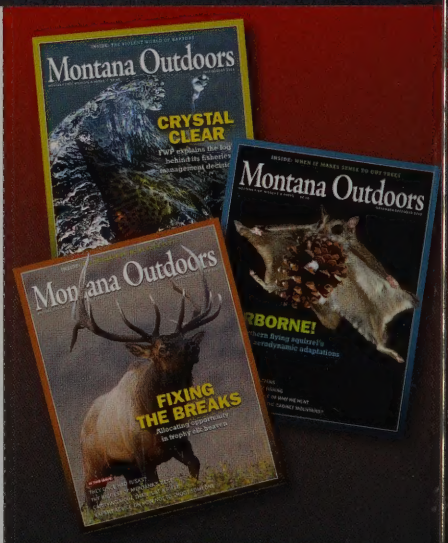

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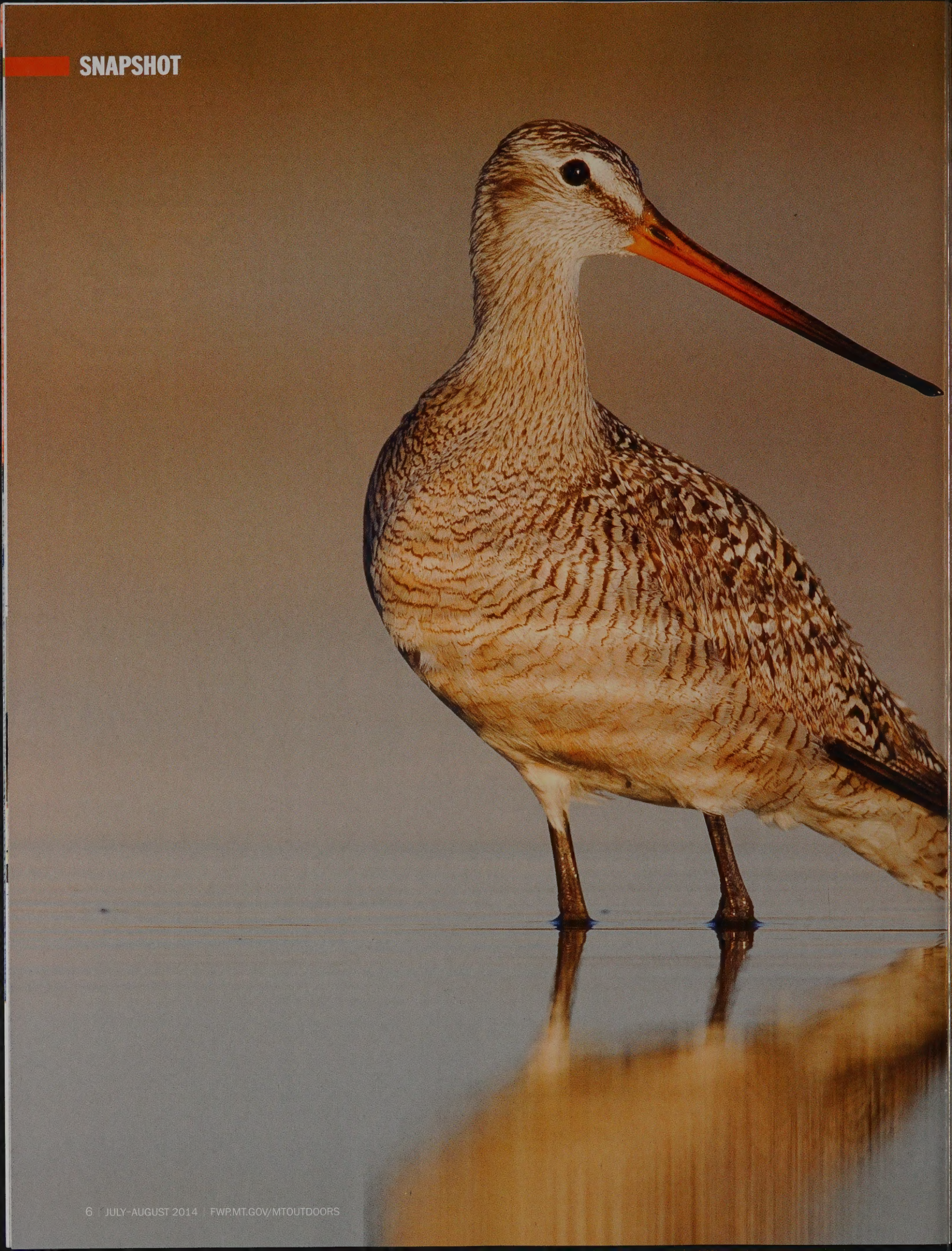
CHRIS MCGOWAN

FLEET FIXER

DUANE JOHNSON
FWP Shop Mechanic, Helena

"**Here I'm working on** one of FWP's various fleet vehicles. These are driven by game wardens, biologists, technicians, parks employees, and other department employees across Montana. At this site we operate the department's only mechanic shop, a fabrication shop, and an electronics shop. In the fabrication shop, my primary area, we build custom truck racks to accommodate winches, lights, tool boxes, tie-down rails, and hydraulic lift beds. We also fabricate and repair items such as bear traps, fish barriers, roadway gates, and trailers. I work here with two other mechanics—Brandon Madden and Joe Mariner. The three of us pretty much do it all—clutches, transmissions, front end repairs, tune-ups, body work, you name it. And we work on FWP's four-wheelers, snowmobiles, boats, and even small generators and water pumps. We also install the truck radios, emergency lights, sirens, video and computer systems, and all other essential enforcement equipment. It's a good feeling knowing that you're helping the wardens, biologists, and other FWP employees by keeping their vehicles in good working condition. Before working here I didn't pay much attention to FWP trucks on the road. Now I'll be driving along and will spot every one that drives past. I tell my wife, 'Hey, I worked on that truck a few months ago. Lookin' good!' "



"I was down on my belly, right on the edge of the water in the muck, when I took this shot," says **MELISSA GROO**, a wildlife photographer from upstate New York who frequently visits Montana to photograph birds. "I had my camera mounted on a Skimmer Ground Pod, a device that looks like an upside down frying pan and allows you to slide your camera around on the ground to get the best angle." Groo took this photograph of a marbled godwit at Bowdoin National Wildlife Refuge, near Malta. "I was mainly shooting American avocets that day, but then I saw this guy, off on his own, preening. I especially like this particular photograph because the angle of the godwit's bill matches the angle of its body. It expresses the gracefulness of these beautiful birds."

91.7°

Average daily high for the month of July, in degrees Fahrenheit, in Hardin, making it Montana's hottest town, according to data from the National Climatic Data Center.

Funding dilemma booklet available

Montana's last resident hunting and fishing license increase was nine years ago. Costs and responsibilities have grown since. As a result, FWP must increase revenue, do less management, or find some combination of both. The 2015 legislature will make the final call.

To help all Montanans understand why FWP faces this funding dilemma and the options being considered, the department has produced a booklet, *Choices for the Future*, and provided information on the FWP website. Get the booklet by calling FWP at (406) 444-5616. Or read a PDF version at **fwp.mt.gov/choices2015**. The web page also includes funding recommendations made by the Fish & Wildlife Licensing and Funding Citizen Advisory Council.

FISHERIES MANAGEMENT

Hatcheries essential in Montana

Hatcheries don't receive much attention in a state famous for its wild trout rivers. But raising and stocking fish is still an essential part of Montana's fisheries management, says Eileen Ryce, FWP Hatchery Bureau chief.

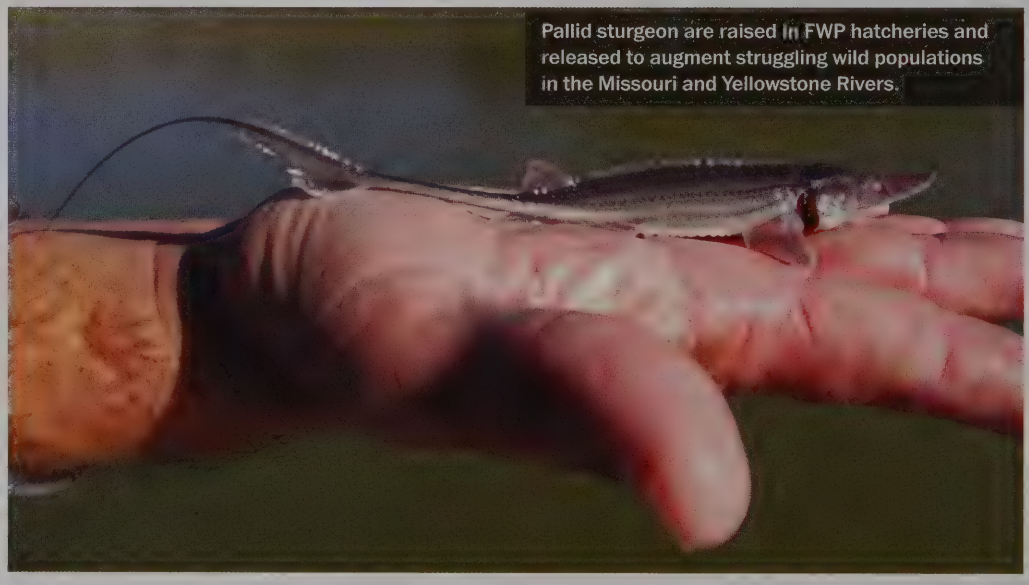
Ryce points out that hatcheries provide fishing opportunities in reservoirs, mountain lakes, and prairie ponds, help maintain gene pools of native species such as cutthroat trout and arctic grayling, and help restore endangered pallid sturgeon.

FWP's ten coldwater facilities produce trout and salmon that are stocked into nearly 500 lakes, ponds, and reservoirs statewide. Two warmwater hatcheries produce walleye, northern pike, tiger muskie, catfish, and largemouth and smallmouth bass that go into more than 120 lakes, ponds, and reservoirs. The state's biggest hatchery, at Fort Peck, produces warmwater and coldwater species.

"Nearly all of Montana's lakes, ponds, and reservoirs depend almost entirely on hatchery-raised fish," Ryce says. "In most mountain lakes, for instance, the lack of spawning tributaries and favorable growing conditions means there wouldn't be any trout there at all unless we stocked them."

Fish propagation starts when crews obtain eggs and milt, either from wild fish or "brood" stock kept at hatcheries. At Fort Peck, for example, FWP crews and volunteers net ripe, ready-to-spawn female walleye from which they harvest millions of eggs. Once fertilized, the eggs of various fish species are transported to "production hatcheries," where they are hatched into tiny newborn fish. These mosquito-sized fry are then stocked or raised for a year or more. Most walleye are stocked as fry or as 2-inch fingerlings, and most trout are stocked at 2 to 6 inches long.

Genetically pure westslope cutthroat eggs are taken from wild trout and propagated to help recover populations of the state fish in parts of western Montana. FWP hatcheries also rear pallid sturgeon, a federally endangered species. The young fish are stocked in the hopes that they will grow to breeding age—20 years or older—and begin reproducing in the wild on their own. ■

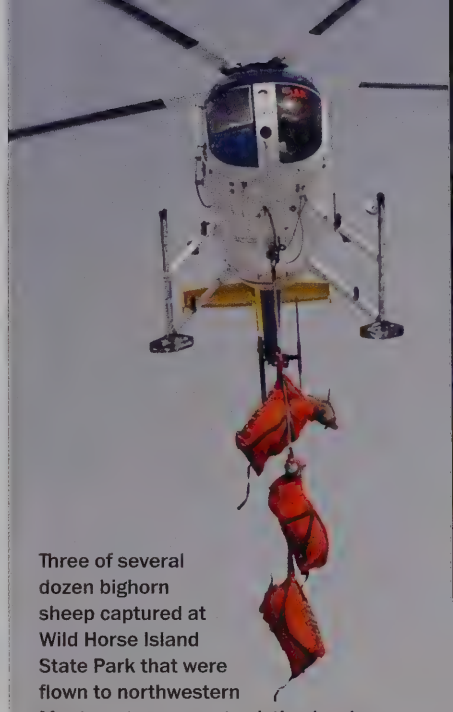


Pallid sturgeon are raised in FWP hatcheries and released to augment struggling wild populations in the Missouri and Yellowstone Rivers.

Fishing a Montana river for the first time? The best place to start is at an FWP fishing access site (FAS). These state areas are more than just boat ramps. Most are also great places for wade fishing, providing access to public waters for miles up- and downstream. Many fishing access sites also allow primitive camping for a small fee. Access the online FAS guide, which contains information on and detailed maps of 300-plus access sites, at **fwp.mt.gov/fishing/guide/fasGuide.html.**

CLOCKWISE FROM TOP LEFT: ILLUSTRATION BY MIKE MORAN; CHUCK & CAL F. ROBBINS; MONTANA FWP; *MONTANA OUTDOORS*; ANDREW MCKEAN/FWP; MONTANA FWP

The Fish and Wildlife Commission will decide in July whether to retain, restrict, or end sage-grouse hunting.



Three of several dozen bighorn sheep captured at Wild Horse Island State Park that were flown to northwestern Montana to augment existing herds.

CONSERVATION

Sage-grouse hunting season may close

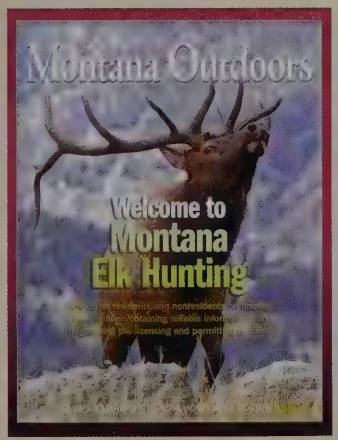
Preliminary results indicating a continued decline in Montana's sage-grouse population have opened the possibility that FWP might close some or even all hunting for the bird during the 2014 season.

State biologists counted an average of 14.9 males per sage-grouse strutting ground, or lek, last year and noted that preliminary indications show little or no improvement in 2014. Last year's count was the lowest recorded since 1980, dropping 48 percent below the long-term average. Montana's long-term lek-count trend is roughly 30 males per lek on about 90 preselected sage-grouse strutting grounds. Preliminary 2014 numbers show no improvement across most of Montana's three sage-grouse management zones.

At its May meeting, the Fish and Wildlife Commission proposed, for public comment, to maintain the existing sage-grouse hunting season, close certain regions, or make other restrictions. Final Montana counts for 2014 will be available for commission review at its July meeting, when a final decision will be made. ■

Free FWP elk hunting guide

For those new to elk hunting in Montana, one of the hardest things about the endeavor is not the hunting itself or even hauling out several hundred pounds of meat from steep backcountry. It's figuring out the licensing process—not to mention finding a place to hunt and deciding when to go.



FWP's free online booklet *Welcome to Montana Elk Hunting* helps hunters easily navigate license and permit procedures, explains how bonus points work, and provides resources for finding the best hunting districts. Other tips include how to pack an elk out, find trophy areas, and decide what essential gear to bring.

View or download the booklet PDF at **fwp.mt.gov/hunting/licenses/nowAvailable.html.**

FWP officials note that 2014 nonresident deer and elk "combination" licenses (which include upland bird and fishing licenses) are still available. As this issue went to press, only 2,315 big game (elk and deer) combination licenses, 1,886 elk combination licenses, and 1,299 deer combination licenses remained. ■

When sheep fly

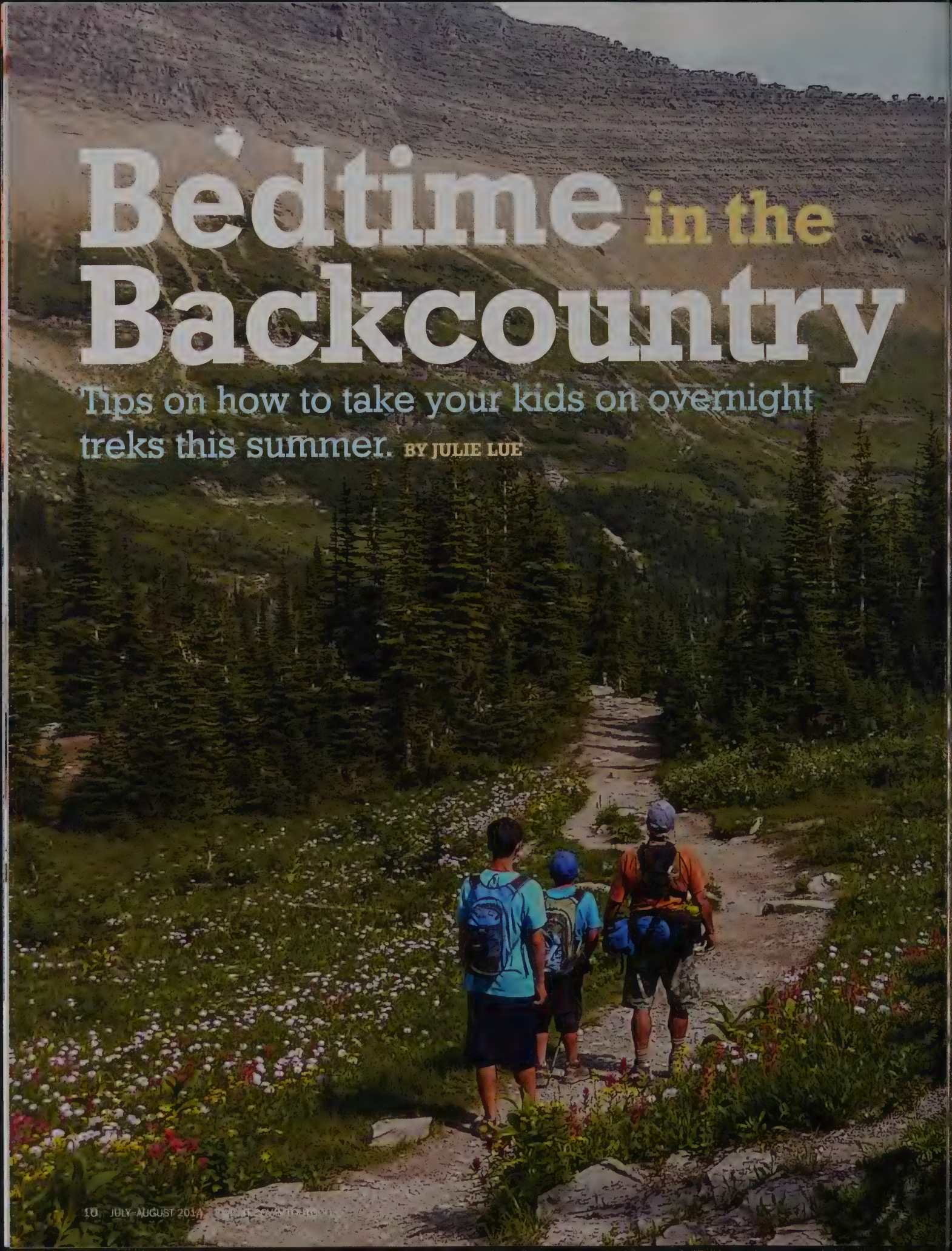
Many bighorn sheep across Montana struggle to survive habitat loss, highway mortalities, and pneumonia outbreaks. But several herds recently received "help from above."

In February, FWP crews captured 21 ewes, 1 male lamb, and 39 rams on Wild Horse Island State Park in Flathead Lake. As part of the operation, conducted with staff of the Confederated Salish and Kootenai Tribes, the sheep were flown to Big Arm State Park on the lake's southwestern shore. There the animals were tested for pneumonia and other diseases, weighed, and had blood samples taken. One sheep died during the capture operation and another one escaped.

The remaining 59 sheep were successfully released in two locations in northwestern Montana to bolster existing herds.

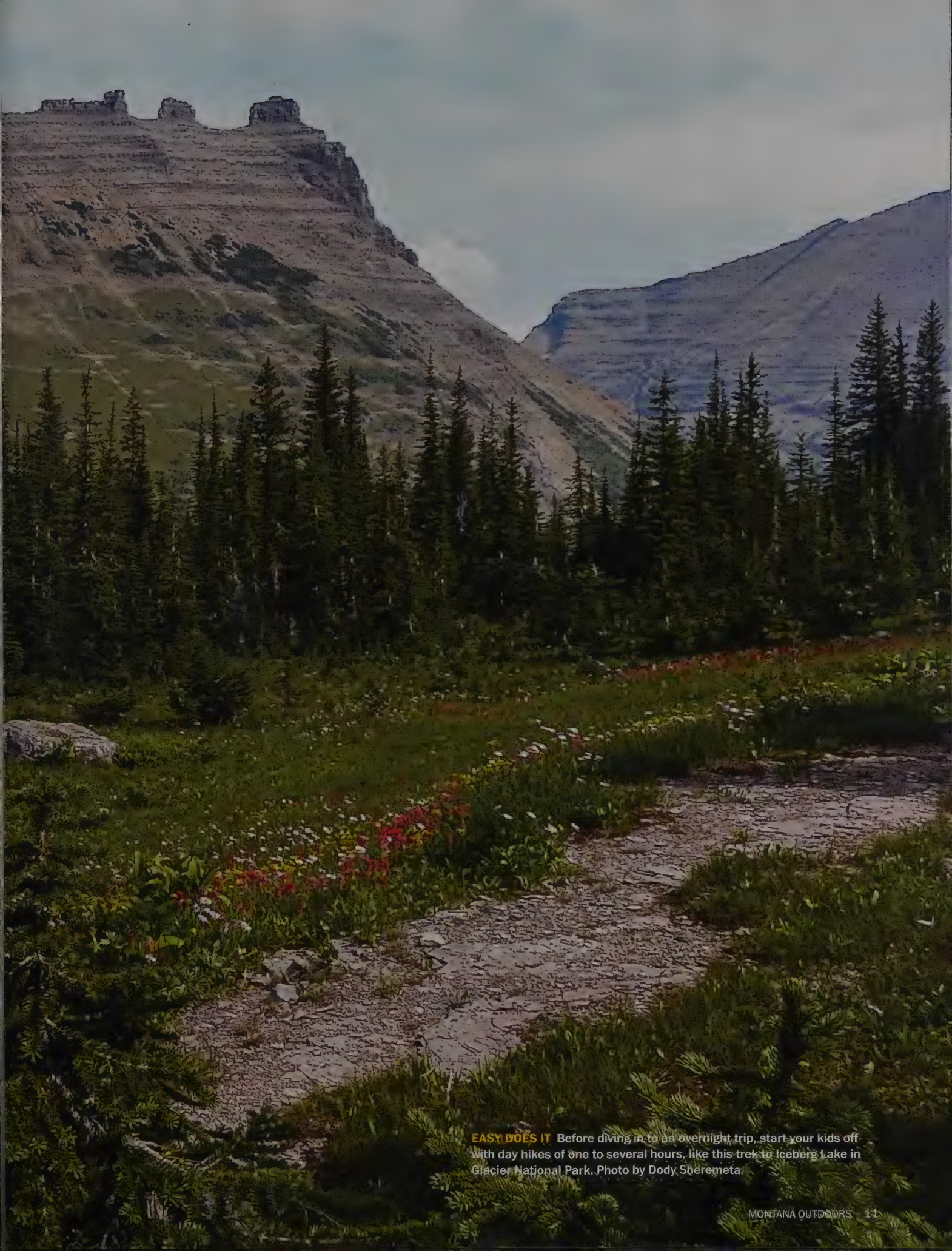
The capture project keeps Wild Horse Island's bighorn sheep from overpopulating and denuding shortgrass prairie that is habitat for other wildlife, too. The island's target population is about 100 sheep, but numbers had reached 160 to 200.

Project funding came from the annual auction of a single Montana bighorn hunting license through the Foundation for Wild Sheep.



Bedtime in the Backcountry

Tips on how to take your kids on overnight treks this summer. BY JULIE LUE



EASY DOES IT Before diving in to an overnight trip, start your kids off with day hikes of one to several hours, like this trek to Iceberg Lake in Glacier National Park. Photo by Dody Sheremeta.

When my husband first suggested that we take our kids backpacking, I balked. I hadn't carried serious weight since the boys' early years, when hauling 25 pounds of squirming, hat-flinging toddler left me exhausted before we lost sight of the trailhead.

And although our sons were now old enough—8 and 11—to enjoy our day hikes and fishing trips, I was afraid that giving them a heavier load would destroy their enthusiasm. Dragging a reluctant child up a trail feels as hopeless as trying to climb a talus slope in flip-flops.

Despite my strong reservations, the idea started to grow on me. I spent most of my twenties working in national parks, where backpacking was part of my life both on and off duty. Years later, I still remembered meeting a pine marten over a cup of camp cocoa, watching stars appear in a truly black subalpine sky, and following bear tracks along a flooded red-desert wash. I wanted to give my children a chance to experience remote places in the same way.

So with a couple of positive votes from the kids, I fell in with my husband's plans, and by summer's end we had taken our first three backpacking trips as a family. They weren't perfect. On the initial uphill stretch of our first overnighter, our youngest son curled up on a rock, pulled a bandanna over his face, and said, "I want to be teleported." And we didn't always reach our goals. On one trip in July, plagued by heat and mosquitoes, we even hiked out early. Yet, despite these occasional setbacks, our family experienced some unforgettable days outdoors. We picked huckleberries near camp, studied tadpoles in an alpine lake, ran up a trail dodging an angry goshawk, and fell asleep to the calls of varied thrush. Then one day in August, when we were day hiking in the Beaverhead Mountains, the boy who had begged to be teleported looked around and asked, "Can we go backpacking up here next summer?"

In the parks, I had spent years helping people plan their backpacking trips. With my children, I found that I just needed to take my own advice, with a few adjustments as my husband and I reconciled adult-sized ambitions with child-sized needs. Here's some of what I've learned:

Work up to it

The first step is to decide whether you and your kids are ready to begin actually backpacking or if you should start with shorter outings. It's far easier if you wait until your children can (and will) walk a few miles and carry some of their own things.

This is also a good time to start recruiting another adult to go with you, both to help carry the load and keep everyone safe. You can't count on cell service in the backcountry. If you're the only adult, who will go for help in an emergency?

Start with short hikes of an hour or two. Then expand your day trips until they involve everything but the overnight. Get children used to carrying daypacks that hold their rain jackets, fleece layers, water bottles, and snacks. Take a water filter or other purification system and teach kids how to collect more water along the way. When the weather is cool, bring a backpacking stove to make lunch along the trail (working the stove should be an adult's job). Throw in a plastic trowel in case someone needs to dig a cathole. "Using the bathroom" where there isn't one is an unglamorous but necessary backcountry skill.

On day hikes, teach your kids about trail etiquette, such as not shortcutting switchbacks, and show them what to do when horseback riders approach. You'll also want to talk about how to avoid getting struck by lightning, prevent hypothermia, negotiate any stream crossings, stay clear of steep drop-offs,

For your kids' first backcountry overnight, you may want to go somewhere familiar rather than strike out on a grand expedition.

Julie Lue is a writer in Florence.

and remain safe in bear and mountain lion country. Give each child a whistle to blow in case they get lost or into trouble, and teach them to read maps and signs carefully.

Even if you never progress beyond this stage, you'll still be giving your children a good foundation in outdoor skills. When they grow older, they can take the next step on their own.

Find your place

Once you're ready to take the plunge and try an overnight trip, you'll need to do a bit more planning. Fortunately, you don't have to figure everything out on your own. Talk to friends, search online, visit camping stores, and pick up a few books at the library or bookstore on backpacking with children.

For your kids' initial backcountry overnight, you may want to try somewhere familiar rather than strike out on a grand expedition. Use your day hikes to scout for existing campsites, and choose a destination that is no more than a few miles from the parking lot, doesn't require too many uphills and downhills, and has access to water. Avoid campsites near cliff edges or fast water, or areas known to be used by grizzlies (at least until your family becomes experienced at keeping a clean campsite). Plan to set up a base camp and stay for two nights. Day two is the best part, as you get a chance to hike and explore without a fully loaded pack.

Check with the agency in charge of the area you plan to visit to learn about any permit requirements or other regulations. For those first few overnight trips, avoid busy Glacier or Yellowstone National Parks, where backpackers must stick to an itinerary. Instead, head to a national forest, where you have more flexibility.

Because weather can make or break an overnight outing, be sure to monitor the forecast during the week before your scheduled hike. A chance of rain or even a skiff of snow doesn't mean you'll need to cancel the trip, but you'll want to bring appropriate clothing, sleepwear, and footwear so everyone is comfortable. If visiting the high country, call around beforehand to make sure winter snows have melted. When you're backpacking with children, you want conditions to be as favorable as possible.

BIGGER LOADS When kids are small, adults need to carry most of the weight for overnight trips. As children grow older, stronger, and more experienced, they can carry daypacks that hold water bottles, snacks, and rain jackets. From there, it's just a short step to full-scale backpacking.

CLOCKWISE FROM TOP LEFT: DUSTIN DE YONG; RICK CLARK; CHRIS MCGOWAN; SHUTTERSTOCK

Get your stuff together

Even if you have been car camping for years and have a closet full of backpacking relics, you'll probably need additional gear to outfit your family. Look at suggested packing lists online to determine what you need to buy, and, for expensive items, what you need to borrow or rent. My husband and I took advantage of fall clearance sales to buy warm mummy bags for the boys and a four-person backpacking tent (some families use two smaller tents).

It's hard to find kid-sized overnight packs to borrow or rent, so you'll probably have to buy new ones or have your children carry lightly loaded daypacks, preferably those with a decent hip belt. For a few years we used daypacks for our boys before buying real backpacks that let them carry weight more comfortably. Although the standard rule is to load overnight packs to a maximum of 25 percent of body weight, I think 10 or 15 percent is more reasonable for children.

As you buy clothing for your kids throughout the year, try to find quick-dry items that can be worn in layers during overnight trips. Pack extra clothes, as kids are likely to get theirs wet, muddy, or food-stained. They need to sleep in something that's dry and doesn't smell like dinner—you don't want to attract bears.

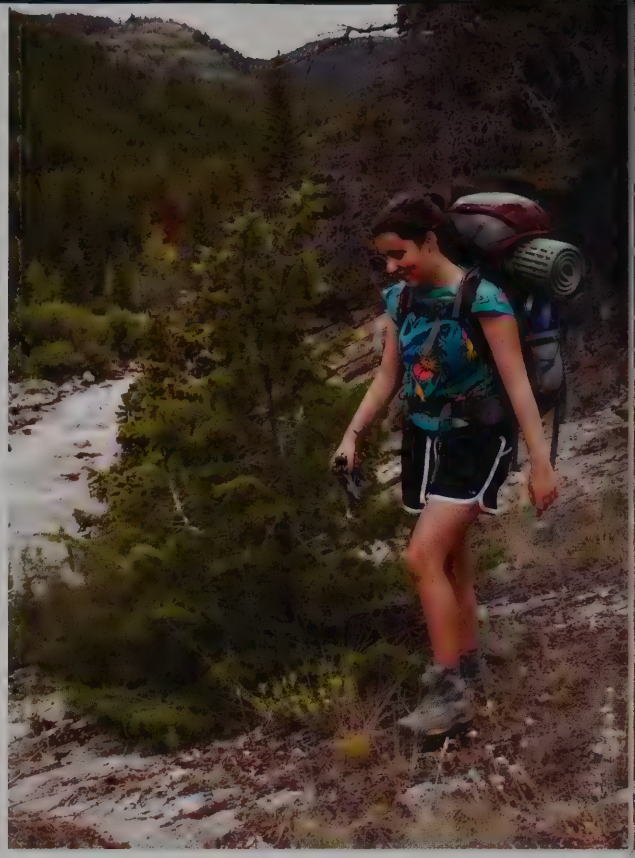
Don't forget to update your first-aid kit with children in mind. Add a few pediatric medications, some electrolyte-replacement packets, and a pack or two of adhesive gel blister bandages.

Plan your meals

Some people prepare gourmet meals in the backcountry, and more power to them. But when kids are part of the expedition, it's easier if you keep your culinary standards low. Fortunately, children seem to be open to eating almost anything if they're up a trail and out of options. When testing backpacking meals at home, my sons said the food tasted "artificially flavored" and "weird." Yet on that first night at camp, our pickiest eater attacked a pile of rehydrated freeze-dried spaghetti and said, "This is good. What I like is that it's really hot."

In addition to expensive freeze-dried meals, you can find lightweight, shelf-stable, quick-cooking dishes in both the processed food and health food aisles of grocery stores. Many are tasty variations of pasta that are easily hydrated with boiling water. Before your trip, let your kids take part in meal preparation by helping you make homemade fruit leathers or granola, or by putting packaged foods in clear plastic storage bags to reduce the amount of cardboard trash you need to carry out.

When backpacking, perfect nutrition doesn't matter as much as total calories. Plan for meals and snacks and then pack a little extra, particularly foods that require no preparation. Don't forget a few special treats to help you cope with "attitude emergencies" (both your own and those of your kids). And remember: No food goes in the tent, ever (again, because of bears).



SELF SUSTAINED Most young teens do fine with fully loaded backpacks weighing up to 25 percent of their body weight. For younger kids, however, 10 to 15 percent of body weight should be the limit of pack weight to keep the outings fun and not too grueling.

Up the trail

Carrying a pack is hard work for kids, and you may exhaust your entire repertoire of

Update your first-aid kit with children in mind. Add a few pediatric medications, electrolyte-replacement packets, and a pack of adhesive gel blister bandages.

CLOCKWISE FROM TOP LEFT: DEE LINNELL BLANK; CHRIS MCGOWAN; SHUTTERSTOCK

distractions as you try to entertain them on the way to the campsite. But even more important than keeping kids happy is keeping them safe. Make sure you know which adult is responsible for each child, and never let children run unattended between two groups on the trail—a mountain lion may be watching. You need to stay close enough not just to see them, but to intervene if they're in trouble. Sometimes, like when you're hiking a trail with a dangerous drop-off, that means keeping them no more than an arm's length away. Make sure that everyone drinks plenty of water and stays cool on hot days, and warm and dry on cool days. Don't let kids get their only pair of shoes soaking wet or they will suffer the entire trip.

Never bored

For kids, being at camp is the payoff for hauling all that gear from the trailhead. Even chore-shirkers enjoy helping set up tents, arrange bedding, and hang the food bag. They can learn how to keep a clean, responsible camp by following your example (see Leave No Trace guidelines at www.lnt.org). But the best thing about camp is not what children learn from you; it's what they teach themselves.

Under your watchful eye, they can explore and observe all the small things that would go unnoticed if you were day hiking and had to rush back to the trailhead—like a sculpin flattened against the lake bed, a bat snatching bugs above the stream, or the claw marks a black bear scratched into an aspen trunk. When deprived of their traditional sources of entertainment, kids will make their own. On our trips, no one ever said, "I'm bored." The boys went fly-fishing, played "mummy attack" in the tent, raced stick boats in the creek, and awarded "sneaky-route" points to the dog as she helped us navigate an unimproved trail.

At night, your kids probably will sleep better than you do, even if you have brought along a deluxe sleeping pad and backpacking pillow for yourself. But as you lie awake waiting for sleep to come, you can feel good about giving them a sense of comfort in the outdoors and the skills they need to explore it long after you're able to take them.

So far, my husband and I have not reached those distant lakes that first inspired us to try backcountry overnights with our boys. We hope to get there someday. But it won't matter if we don't. We learned that backpacking with kids is not about distance; it's about time—time spent together as a family, free of distractions, and time spent immersed in wild places. It isn't easy, but like so many other types of outdoor recreation, it's worth the effort.

"I DID IT!" Kids gain a great sense of accomplishment and confidence by backpacking to remote areas. The hiking can be tough, but the payoff is spending time at camp, where they can play, explore, and take part in creating the family's new outdoor "home."

Bully Goats?

Researchers try to figure out if relative newcomers to the Greater Yellowstone Area are displacing native bighorn sheep.

By Jack Ballard

THE SUMMIT OF GRIZZLY PEAK rises some 200 yards above where I stand. At its 9,416-foot apex is a tiny grove of wind-battered pines and the upper terminal of a Red Lodge Mountain chairlift. A sudden gust stings my face with icy shards of snow as I sit down on the chair. Though I'm bundled in a down jacket and insulated ski pants, the lift-ride in single-digit temperatures sends me shivering and seems to take an hour, though it lasts only several minutes.

As the chair nears the top, I catch a glimpse of even higher peaks and a broad, frozen plateau some 4 miles south. Depressions on the flat alpine area lie flush with snow, but gales have cleared its flanks and ridges to reveal tinges of cured grass and other vegetation in a sea of stone. The visible plateau is the first in a series of treeless tablelands extending to the Wyoming border and beyond.

Somewhere, huddled in a leeward pocket or holed up in the shelter of a snarl of gnarled evergreens, wildlife are enduring winter in that inhospitable environment. The Beartooth Range, of which these icy summits are a part, is home to many herds of bighorn sheep. Though some of the animals migrate downhill to spend the snowy season where food is more abundant, others are able to remain and survive on the small amount of exposed grasses.

SUMIO HARADA

MOVE ALONG A bighorn sheep ram herds a lamb past a wary mountain goat during midwinter in the Absaroka Mountains. The sharp-horned goats, transplanted in the mid-1900s, are thriving in much of the Greater Yellowstone Area, while numbers of native wild sheep are declining. Researchers with Montana State University, Montana Fish, Wildlife & Parks, and other organizations are looking for a connection.

Mountain goats also live in that harsh environment. But while the sheep have been here for eons, the goats are transplants, gaining their foothold not from the evolutionary forces of time, but through human intervention.

Wildlife biologists, hunters, and others who helped move mountain goats there from similarly mountainous parts of western Montana suspected that the alpine animals would fare well. And they have. Yet while goats have been thriving in their new homes during the past several decades, bighorn sheep numbers in many of these same areas have been declining. Those who once thought the two species could coexist in the region are now having second thoughts. Several new studies could help scientists learn whether mountain goats are causing wild sheep to disappear from the region, and, if so, why.

Never migrated

Bighorn sheep have roamed the Yellowstone Region for thousands of years. The earliest written account comes from Osborne Russell, a trapper who entered the Lamar Valley in today's Yellowstone National Park in 1835. In his *Journal of a Trapper,* he wrote of encountering Mountain Shoshone Indians, later dubbed Sheepeaters, who subsisted largely on bighorns.

Russell never set eyes on a mountain goat in the Yellowstone Region. The white-coated, dark-horned animals are native in Montana primarily west of the Continental Divide, 150 or more miles away. Almost no mountain goats lived in ranges east of the divide, even those containing abundant rocky alpine habitat that goats prefer. Biologists suspect that because the animals rarely cross valleys or other low areas—where they become vulnerable to predators—mountain goats never migrated to isolated mountain "islands" such as the Beartooths.

Most wild goat herds found today in mountain ranges east of the divide grew from animals transplanted more than half a century ago. From 1941 to 1958, Montana Fish and Game crews trapped and transplanted 310 mountain goats (mainly from the Bitterroot Mountains and the Sun River area) to a dozen release sites, including, in the Beartooth Range, the Rock Creek drainage west of Red Lodge and the Stillwater drainage south of Nye. In most cases, the transplants thrived. In the Greater Yellowstone Area (GYA) alone, mountain goats now number over 1,300.

Bob Garrott, professor of ecology at Montana State University (MSU), oversees an ambitious research initiative that studies the ecology and population dynamics of bighorn sheep and mountain goats throughout the GYA, of which the Beartooths are a northeasternmost part. The GYA Mountain Ungulate Project is a partnership of MSU, Montana Fish, Wildlife & Parks, state wildlife agencies in Idaho and Wyoming, the National Park Service, the U.S. Forest Service, and Canon USA. It grew out of concern by Yellowstone National Park officials that non-native goats were expanding into portions of the park's historical native bighorn

sheep range. "The Park Service had no knowledge of what effect goats might have on Yellowstone's plant communities and bighorn sheep population," says Garrott. "All three states then became involved, because they have a vested interest in understanding interactions between mountain goats and bighorn sheep."

The project's initial phase examined historical wild sheep population counts by Montana biologists in the region since 1971 and counts of mountain goats since 1966. Most of the goat populations have seen increased growth and wider distribution in recent decades. Wild sheep counts have been much more variable, with some going up and others declining. However, researchers found no difference in sheep declines between areas that contained mountain goats and those that didn't. "There was no smoking gun on this first step suggesting a direct relationship," says Garrott. "But it makes sense that when you have two big plant eaters occupying the same mountaintops that there'd be some interaction. So now we're studying further, drilling down deeper to uncover more details."

Though evidence from historical herd counts was inconclusive, scientists suspect that goats are in fact displacing sheep. Shawn Stewart, FWP biologist in Red Lodge, points as an example to the Rock Creek drainage. Records show that 100 wild sheep occupied alpine winter range there in the early 1970s. "Goats were in these same areas, but most were on the west side of Rock Creek and most of the sheep were on the east side," he says. Mountain goat numbers began to increase markedly on the east side in the 1980s. Then, in 1991, a severe winter storm killed off 80 percent of the bighorns. "But the goats survived and continued to increase," says Stewart. "And now, 20-plus years later, the bighorns have still not recovered but the goats are going strong. Why?"

Perhaps goats have nothing to do with the continued suppression of the Rock Creek sheep herd that winters in the alpine zone, says Stewart. But he and other biologists have witnessed similar population fluctuations between goats and sheep in other areas of the GYA and conjecture a connection.

Nose-to-nose transmission?

It appears that wild sheep and goats get along fine in summer range. Biologists have watched both species graze amicably on alpine plateaus. Stewart once observed bighorn ewes and mountain goat nannies sharing a single avalanche chute, all with recently born young. Researchers with the Mountain Ungulate Project have used bait stations with salt on alpine summer range to attract both bighorns and mountain goats. The animals often share the salt, says Garrott.

Even so, mingling peacefully among a carpet of gentian in midsummer can cause problems. "That close contact could allow for transmission of disease from one species to another," says Garrott. Bighorn sheep are highly susceptible to pneumonia, and die-offs of 10, 20, or more animals in herds are commonplace across the West. It's well-known that wild sheep can contract pneumonia from domestic sheep. Could they catch it from mountain goats, which in some areas carry the same suite of pathogens—picked up from domestic sheep—suspected in bighorn die-offs? Garrott says that such transmissions are possible, but no studies to date have shown that they occur. "So far we don't understand pneumonia in bighorn sheep very well," he says. "There's no consensus on what particular strain of bacteria causes it, and no evidence showing that pathogens are transmitted from goats to sheep."

Garrott says new studies are under way to see if such a relationship exists. Scientists with the ungulate project are trying to identify what type of bacteria spawns pneumonia in wild sheep, whether it's also carried by mountain goats, and if the pathogens are transmitted from one species to the other.

Garrott says another key factor in goat-sheep interactions may be competition for scarce resources on alpine winter range. "If we need to worry about competitive interactions, it's probably among those segments of

Jack Ballard of Red Lodge is the author of several books on big game hunting and natural history.

OLD AND NEW Bighorn sheep have lived in the Greater Yellowstone Area for thousands of years, while mountain goats are relative newcomers. Below: An 1870 photo of Mountain Shoshone (Sheepeater) Indians, who hunted bighorns by herding the animals into rock pens and killing them using powerful sinew-backed bows. Right: A Fish and Game employee in the 1940s with mountain goats to be released into what is now the Absaroka-Beartooth Wilderness.

FAIR-WEATHER FRIENDS Though goats and sheep appear to get along well in summer when food is abundant, relations might be less cordial in winter, when grass is scarce. "If goats want to be aggressive and start pointing those horns at sheep, the sheep will move," says the MSU research scientist heading a study on relations between the species.

the bighorn sheep populations that don't migrate to lower elevations in the fall but instead stay high and winter on wind-blown ridges," he says. "The food source is extremely limited. If there's antagonism between the species, it most likely will be there." Garrott adds that the mountain goat's sharp horns are far more formidable weapons than the sheep's horns. "If goats want to be aggressive and start pointing those horns at sheep, the sheep will move," he says.

Researchers with the GYA Mountain Ungulate Project are now studying interactions between the two species in midwinter. The work is challenging if not, at times, impossible. Flying conditions are often dangerous, the weather is unpredictable, and locating scattered bands of light-colored bighorns and white goats on the snowy heights is like searching for katydids on a golf course.

Garrott and other researchers are capturing mountain goats and sheep from several areas of the Yellowstone Region where both species interact and other areas where the ranges don't overlap. The goats and sheep are fitted with collars containing Global Positioning System devices that record each animal's position every six hours for two years. The goal, says Garrott, is to better understand habitat use to see what factors may contribute to sheep declines. "Mountain goats and bighorn sheep have successfully coexisted in western Montana, where they are both native, suggesting that they have evolved to occupy somewhat different ecological niches," says Garrott. "But in other places, like parts of the Greater Yellowstone Area, the two species don't seem to coexist. We're trying to figure out what drives the differences. Is it habitat use? The particular vegetation in different areas? Disease transmission? Or something we haven't even yet identified as a factor?"

If studies show that some GYA bighorn herds are indeed affected by the presence of mountain goats, wildlife managers may propose reducing goat numbers through public hunting. "If you decide to manage for sheep, you can ramp up the number of goat tags in an area," says Stewart. "It may come down to the wishes of the public." Management is more difficult in national parks, where hunting is banned. Garrott says officials in Yellowstone and Grand Teton National Parks have begun thinking about what, if anything, they might do if studies show that wild goats are driving out wild sheep in some areas.

Garrott notes that, so far, it's not clear what it means to have non-native goats in the GYA with bighorn sheep. "Perhaps nothing," he says. As I exit the chairlift atop Grizzly Peak and begin my descent, I take one last look at the frigid roof of the mountains, where hardy bands of bighorns have wintered for eons, and hope he is right.

Learn more about the GYA Mountain Ungulate Project at gyamountainungulateproject.com.

TOUGH ENOUGH? Though remarkably hardy, bighorn sheep haven't naturally expanded their range in Montana and are even losing ground in some areas. Habitat loss, highway mortality, and disease are the main reasons. Mountain goat presence might be another.

LEFT TO RIGHT: WILLIAM HENRY JACKSON/JACKSON HOLE HISTORICAL SOCIETY; JIM MCLUCAS COLLECTION/MONTANA'S WILDLIFE LEGACY PROJECT; ROBERT GARROTT/MONTANA STATE UNIVERSITY; DONALD M. JONES

Untrammeled

On its 50th anniversary, a look at the historical forces that forged the Wilderness Act, and what wildlands mean to us today. **BY HAL HERRING**

ATOP THE SCAPEGOAT WILDERNESS. PHOTO BY JESSE LEE VARNADO.

For a few years at the end of the 1980s, I managed a small ranch west of Stevensville, in the shadow of the mighty Bitterroot Mountains. Our irrigation water came from North Kootenai Creek, by way of an old and oft-plugged headgate a half mile up the canyon above the ranch. A trail ran beside the creek, which varied by season from a knee-deep pour of water as clear as mountain air—a luxurious place to lie down in the noon heat of summer—to a frothing monster that could and did take the lives of children and grownups alike during years of heavy snowmelt.

My life was smaller then, circumscribed by the six-days-a-week commitment to the ranch, but it was huge, almost boundless, in another way. On Sundays, or when haying was done and the irrigating work not yet resumed, I would follow the trail beyond the headgate, threading the shoulder-high thimbleberry bushes in the shade of the mighty cliffs, watching the dippers flit back and forth in the shafts of sunlight falling to the creek, and simply walk west. The drainage—one of the dozens of colossal U-shaped glacier scours that carve the range from west to east—yawned endless, bound by the black fortress cliffs and towers to the north, the vast tongues of gray talus tumbling beneath them. Ancient fire-scarred ponderosa pines cast their scent of vanilla from sun-heated bark, and raspberries, currants, and serviceberries grew in verdant thickets wherever there was enough light. After 4 miles or so, you passed the wooden sign that marked the border of the Selway-Bitterroot Wilderness, and the trail became a bit narrower, the landscape even more overwhelming. The Kootenai Lakes lay another 5 miles in, an alpine world of fierce cirques and sodden, melt-saturated meadows carpeted with a hallucinatory blend of blooming wildflowers. This was summer elk country, and mountain goat country, along with marmots, black bears, moose, and an occasional big mule deer buck stalking the subalpine firs and whitebark pines, alone and wary. This was, to me, solitude writ large, self-reliance, adventure, freedom. It was Wilderness, with a capital W, a place far apart from that crowded world where the concerns of mankind overwhelmed every other sound and almost every thought.

Over the next 15 years or so, I spent some part of each year in different parts of the Selway-Bitterroot Wilderness, hunting, snowshoeing and skiing, fishing, and wandering aimless as a spiderweb on the wind, in fair weather and foul. A few times I crossed the mountains all the way to the Selway River in Idaho, where I slept nights in the white sand carried there by snowmelt floods, caught rubber boas on the trail and dodged rattlers in the scree, ate blue grouse and cutthroats and suckers cooked on tiny fire pits gouged out of the river gravels. I was caught in a forest fire, benighted by cliffs and blizzards, and humbled by exhaustion, heat, and cold, and by the profound and ancient truth that here you were truly on your own, to exult or despair according to your abilities and tenacity.

I look back on those days and weeks now and am astonished how powerful those experiences were, how a wild place like that can inhabit you, become a part of who you are, forever.

"MAN HIMSELF A VISITOR"

The Wilderness Act was passed in 1964, 50 years ago, the same year I was born. I and the millions of Americans born that year and since have never known an America without a designated wilderness, from the 5.5-acre Pelican Island in northern Florida to the Selway-Bitterroot to the sprawling 9 million acres of glacier, alpine forest, and raging rivers in Alaska's Wrangell-Saint Elias. The United States is home to over 109 million acres of designated wilderness (53 percent in Alaska) scattered across 44 states and Puerto Rico. That's a lot of room to roam and experience some of the last landscapes on our planet not dedicated solely to the material progress of mankind. The Wilderness Act itself may say it best: "A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain...."

On a planet of over seven billion human souls (more than double the population in 1964), and at a time when industrialization and agricultural conversion have, while raising living standards for countless millions of people, transformed an estimated half of the entire surface of the planet, Americans have set aside almost 5 percent of their lands as wilderness, a choice that is utterly unique in the world. To understand that choice is a life's work of scholarship, a time machine flight through our history and beyond to the oldest notions that spiritual truths and meaning could best be sought far from the distractions and fleshpots of the settled places. The Israelites sought and found wisdom during their 40 years' sojourn in the deserts, Shinto Buddhism in Japan celebrated wild nature in a way that Europeans never did, and the Chinese of the 5th century

BOUNDARY SIGN, CABINET MOUNTAINS WILDERNESS. PHOTO BY STEVE GNAM.

Hal Herring of Augusta is the conservation blog editor for Field & Stream *and the author of* Famous Firearms of the Old West.

revered wilderness as the resting place for the human spirit exhausted by man's endeavors and wrote some of the world's most beautiful poetry in homage to it.

By contrast, until the late 19th century, wilderness in America was viewed as desolation, its mere existence an illness to be quickly cured with axe, rifle, and plow.

And yet no designated wilderness areas exist in Israel today, none are in China, and Japan has just one, closed to public access and consisting of fewer than 14,000 acres. It was Americans who would lead the world in protecting wild country and making it available to anyone seeking adventure or solace.

Why, within the span of just two generations, did a people who once feared and reviled wilderness begin to value it so much that they protected more wild lands than any other nation in history? Part of the answer lies in our love of America's creation story—of the pioneering men, women, and children venturing into the unknown, of the ruggedly independent fur trappers, of Daniel Boone, Lewis and Clark, Jim Bridger, and John Colter, and the Native Americans they lived with and often fought. Our bookshelves sag under the weight of stories about brave frontiersmen and -women, forged like the hardest steel by the howling dangers of the wildest country. This is the literature and the history that produced John Muir, wandering the high Sierras alone, and Henry David Thoreau in his simple cabin in Concord, writing about Maine's unconquered Mount Katahdin. This is the history that inspired the influential historian Frederick Jackson Turner, who, in 1893, set off a blazing debate with his "Frontier Thesis" by writing that "American democracy was born of no theorist's dream; it was not carried in the…Mayflower to Plymouth. It came out of the American forest, and it gained new strength each time it touched a new frontier." Turner, like many of his contemporaries, including Theodore Roosevelt, worried that the closing of the American frontier, with its demands for both cooperation and strong, pragmatic individualism, would pose a direct threat to the future of democracy. Roderick Nash, in his classic study *Wilderness and the American Mind*, wrote

Continued on page 26

LITTLE ROCK CREEK, BELOW EL CAPITAN MOUNTAIN IN THE SELWAY-BITTERROOT WILDERNESS. PHOTO BY JOHN LAMBING.

BLACK MOUNTAIN AND PINE CREEK ABOVE PINE CREEK LAKE IN THE ABSAROKA-BEARTOOTH WILDERNESS. PHOTO BY DOUGLAS ROANE

NOTIONS OF **WILDERNESS**

1760s

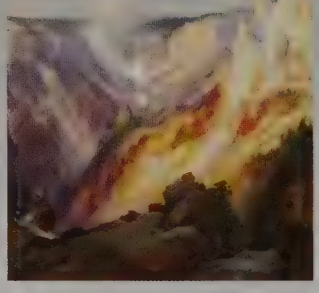
1784: Daniel Boone's "autobiography" (mostly written by another Kentuckian) condemns wild country but also praises the scenery of nature.

For two centuries the New World's "howling" wilderness was seen only as an oppressive wasteland in need of taming by frontiersmen like Daniel Boone and then settlement by pioneers and farmers.

1860s and '70s

1854: Henry David Thoreau writes *Walden*, a reflection on simple living in natural surroundings.

1872: Yellowstone National Park Act passes.

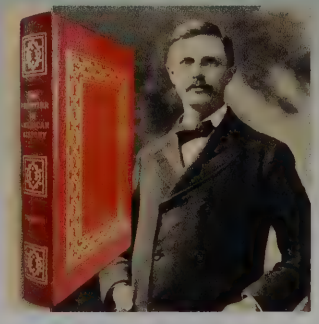


Outright hostility toward wilderness began to soften as Romantic painters like Thomas Moran depicted unspoiled nature not as godless deserts but as awe-inspiring expressions of divinity.

1890s

1890: U.S. Census reports that the nation contains no more uninhabited areas, signaling to many the end of America's frontier era.

1892: The Sierra Club is founded. John Muir is named president.



In his "Frontier Thesis," historian Frederick Jackson Turner argues that taming and interaction with wilderness were essential in forming the unique American character and democracy.

1890s

1903: Part of a growing natural history literary genre, Jack London's *Call of the Wild* is published to popular acclaim.

The Industrial Revolution, urban life, and an increasingly mechanized society pushed people farther and farther from their agrarian roots. A growing number began to seek out natural lands as places of solace and restoration.

Montana awaits new wilderness designation

Montana's last new wilderness designation came in 1983, when Congress authorized the Lee Metcalf Wilderness along the Madison Range southwest of Bozeman. That brought Montana's total acreage of wilderness to 3.4 million acres, or 3.7 percent of the state's total land base.

A wilderness area is free of roads, retains its primeval character, and is protected and managed in ways that preserve its natural condition. The areas are widely used by hikers, hunters, anglers, backpackers, and horseback riders.

Montana also contains 6.4 million acres of U.S. Forest Service and BLM Inventoried Roadless Areas that, with Congressional approval, could qualify as wilderness. About one-third of these holdings have regularly been proposed for designation since 1983.

Two bills before Congress would add wilderness to Montana. One is Senator Jon Tester's Forest Jobs and Recreation Act. It mandates harvest or thinning of 100,000 acres of timber over 15 years while adding 637,000 acres of new wilderness and 360,000 acres of recreation areas allowing some motorized or commercial use.

The other bill, co-sponsored by Senator Tester and former Senator Max Baucus, is the Rocky Mountain Front Heritage Act. It would add 67,000 acres to the Bob Marshall Wilderness Complex while designating 208,000 acres along the Rocky Mountain Front as a conservation management area that allows motorized access, mountain biking, and other current uses. When Senator Baucus retired from Congress last winter, the bill lost its most powerful proponent. Tester and interim Senator John Walsh have declared their support for the act, but they lack Baucus's seniority.

Both bills received bipartisan support from the Senate Energy and Natural Resources Committee, clearing a path for the full Senate to consider them. However, success remains far from certain. The two Montana bills are among 26 wilderness bills awaiting action in Congress.

—Tom Dickson

1906: Antiquities Act passes, allowing the government to restrict certain uses on federal lands.

1913: Hetch Hechy Valley in Yosemite is dammed. Though a loss for preservation, it galvanizes wilderness advocates.

1935: The Wilderness Society is founded by Bob Marshall, Aldo Leopold, and others to advocate for wilderness protection.

1949: A year after his death, Leopold's *A Sand County Almanac* is published, clarifying his "land ethic" and principles of ecology.

1955: Wilderness advocates avenge Hetch Hechy by defeating the proposed Echo Park Dam at Dinosaur National Monument.

1900s and '10s | 1920s and '30s | 1930s and '40s | 1950s

Theodore Roosevelt respected the preservationist philosophy of his friend John Muir, but he also saw value in the utilitarian perspective of conservation that allowed for logging, mining, and other uses.

Born of a wealthy New York family, Bob Marshall argued persuasively throughout the 1930s—until his untimely death at age 38—to have portions of the national forest system designated as roadless areas.

Ansel Adams and other artists brought to the public's attention the grandeur of Yosemite, the Sierras, and other untamed lands, reinforcing growing sentiment for protecting the nation's remaining wilderness areas.

Facing suburban sprawl and the threat of nuclear annihilation in the 1950s and '60s, a growing number of Americans turned to wilderness as places to escape and recreate.

Continued from page 23

"A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain."

of the 1890s, "With a considerable sense of shock, Americans...realized that many of the forces which had shaped their national character were disappearing."

The first half of the 20th century would do nothing—this is an understatement—to dispel those worries. Forests continued to fall, entire rivers were rerouted or drained for economic development, the dust from what was once the Great American Prairie blotted out the sun and stained the streets of New York City. But a conservation ethic began to flower, too, in response to those disasters and excesses. It would take time—and more trouble—for that to come to full bloom.

When the American economy began to take off after World War II, a nation of outdoor people suddenly found themselves with the time and mobility to take to their woods and fields and rivers. The automobile was king, and the country was in motion, with bountiful natural wonders to see and experience. But there was plenty to see that was disturbing, too.

It was a time of roaring factories, increasing pollution, and urban and suburban sprawl that devoured the rural landscapes cherished, if taken for granted, by many Americans. Over it all hung the threat of the Cold War. For wilderness historian Rick Potts, who spent a 35-year career managing wilderness areas in the West, this complex intersection of American history, a booming economy, and the Cold War explains a lot about how the 1964 Wilderness Act came about. "When you read Roderick Nash, he says that in order to understand why you need wilderness, you first have to have civilization," Potts says. "Well, we had plenty of civilization by the mid-1950s. At that same time, we had two civilizations that hated each other, both of which had the power to actually destroy the planet." A natural American reaction to both a bustling, growing nation and the threat of nuclear annihilation, Potts says, was to seek solitude and peace in our last remaining wilderness areas, and to make sure they endured.

AS FREE AS JIM BRIDGER

And endure they have. Even as the population of the United States has, like that of the world, more than doubled over the past half century, we've held on to some of the wildest landscapes left on the planet. The solitude and peace that our parents and grandparents sought and found in the American wilderness is just as plentiful now as it was in 1964. The self-reliance that Turner and Roosevelt worried that we would lose is still highly valued, and those of us who venture into wildernesses still have it. At a time when accessing big game on private land is becoming increasingly difficult, a hunting license, some time, and boot leather are all that's required to reach trophy elk and mule deer country where we can roam and camp at will, almost as free as Jim Bridger or Daniel Boone. Fantastic fishing, backpacking, wildlife watching, and more exist only a few miles from wilderness area trailheads. It's as good as it has ever been, there for anyone who will simply walk to reach it. Those with the will to do so can enter a world of raging rivers, snow-fed wildflower meadows, vast and ancient forests, yawning desert canyons—a world of peace and solitude and indisputable danger, where wolves howl, grizzly bears brawl over mates, and

1956: Sigurd Olsen publishes *The Singing Wilderness*, popularizing the wild canoe country along the Minnesota-Ontario border. | **1964:** Wilderness Act is passed. | **1976:** National Forest Management Act is passed. | **1980:** Alaska National Interest Lands Conservation Act is passed, adding 56 million acres of wilderness to the system. | **1983:** The Lee Metcalf Wilderness is added to southwestern Montana. | **2009:** Omnibus Public Land Management Act is passed. | **2014:** The U.S. celebrates the 50th anniversary of the Wilderness Act.

1950s and '60s → 1970s and '80s → 1990s and '00s → TODAY

Pennsylvanian Howard Zahniser, head of The Wilderness Society for 20 years, was the main proponent of the Wilderness Act, which he first wrote in 1956.

After nine congressional hearings, 6,000 pages of public testimony, and 66 revisions, the Wilderness Act is signed by President Johnson on September 3, 1964.

The Omnibus Public Land Management Act of 2009 added two million acres to the National Wilderness Preservation System, mostly in Idaho, Oregon, and California.

Many Montanans support designation of new wilderness in Montana. Currently two bills are before Congress that would add the first new wilderness acreage to the state since 1983.

RED BUTTE, THE CHINESE WALL, AND SWAN PEAK SEEN FROM PRAIRIE REEF LOOKOUT IN THE BOB MARSHALL WILDERNESS. PHOTO BY DEE LINNELL BLANK.

one false step can easily be your last. What other nation on earth can boast of such abundant access to so much liberty? What other nation on earth would even come up with that idea, much less pass a law like the Wilderness Act?

It's been some time since I last saw the Selway-Bitterroot Wilderness, though I've been lucky enough to hunt or fish or just wander all over Montana, from the Anaconda Pintler and the Absaroka-Beartooth to the Scapegoat, which is closest to where we live now. My wife and I have fed our son and daughter on the cutthroats and elk of the Bob Marshall, the huckleberries of the Great Burn (a proposed wilderness), and the pure wild freedom of the mountains in those and other wildlands. Both son and daughter are on the very brink of being able to walk us into the ground, to leave us behind in their own hunting and seeking. They'll be self-reliant and strong, as wilderness requires.

The decades to come will challenge those of us who love wilderness, as this country's population expands and the short-sighted few demonstrate a shameless willingness to sell our birthright, won by the vision and hard work of Americans who came before us. But if the past is any guide, the United States will never go down that ugly path. Instead, we will cherish the gift of America's wilderness, nurture it where needed, and expand it where possible and practical. In that likely future, my children, and their children and countless others of those generations, from all over the world, will celebrate the 100th anniversary of the Wilderness Act, on some whitewater creek, in some far valley, to the music of bugling elk and screeching gray jays.

Join the MWA's September Celebration

Throughout 2014, the Montana Wilderness Association is celebrating the 50th anniversary of the Wilderness Act at dozens of sites across the state. The festivities culminate in a celebration in Seeley Lake on September 5–7.

The free event, open to the public, includes hikes, tours, activities, speakers, and entertainment. The Mission Mountain Wood Band will play on the night of Saturday, September 6, in the park near Lindey's Prime Steak House. All ages are welcome.

Throughout the weekend, guides will lead hikes to nearby Morrell Creek, Girard Grove, Glacier Lake, Crescent and Heart Lakes, Crystal Lake, Lake Dinah, Sunday Mountain, Rumble Lakes, and more.

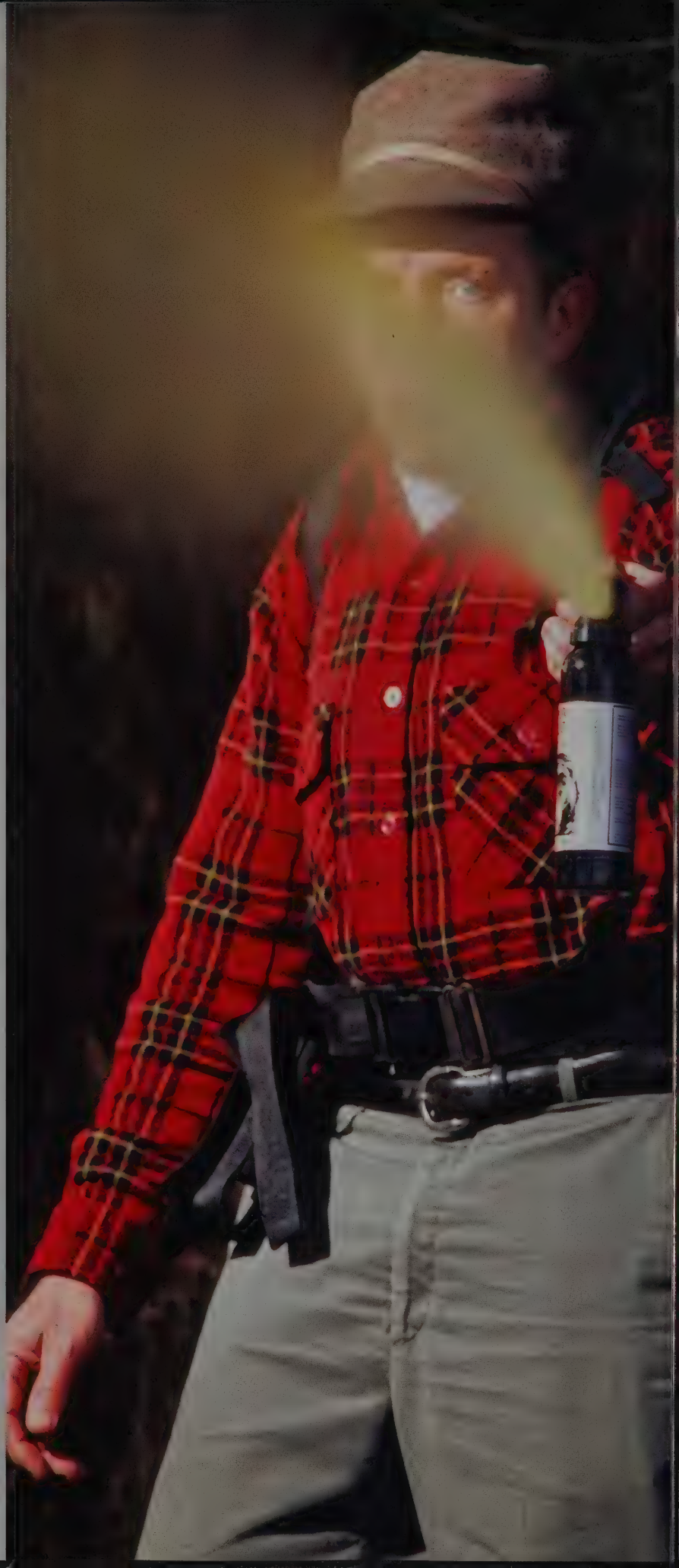
The event also includes free tours of Pyramid Mountain Lumber, a look at the U.S. Forest Service's Nine Mile pack string, a special viewing of the Forest Service's movie *Untrammeled*, and songs and stories from "Montana's Blackfeet Troubadour," Jack Gladstone.

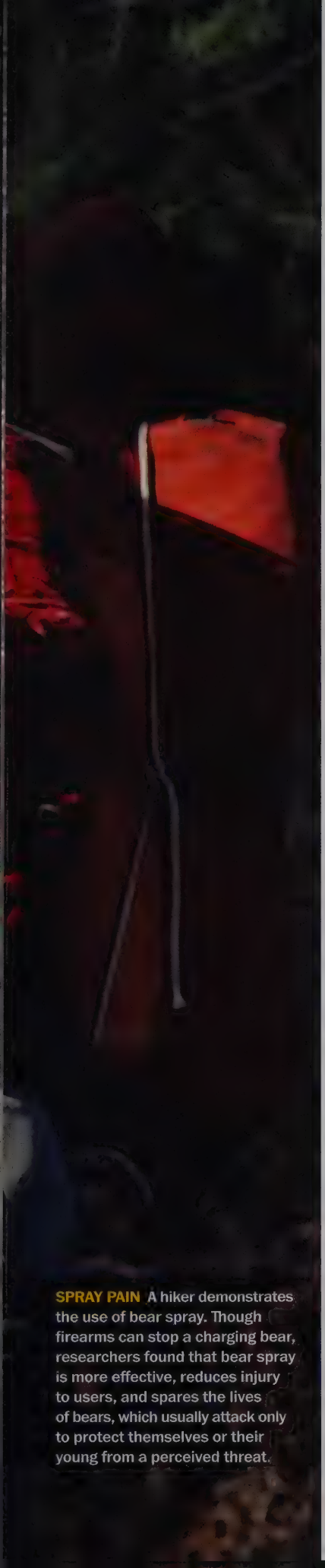
For more information, visit the Montana Wilderness Association website at wildmontana.org or contact Laura Parr at lparr@wildmontana.org or (406) 443-7350 ext. 110.

A WALL OF PROTECTION

A comprehensive study of bear attacks in Alaska confirms that bear pepper spray is a better defense than firearms.

By Christine Paige





SPRAY PAIN A hiker demonstrates the use of bear spray. Though firearms can stop a charging bear, researchers found that bear spray is more effective, reduces injury to users, and spares the lives of bears, which usually attack only to protect themselves or their young from a perceived threat.

BEART GILDART

It was a windy day in 1995. Frank Vitale and three friends were horsepacking along Tuchuck Ridge in the Whitefish Range of northwestern Montana.

Vitale, a longtime hunter, horsepacker, and outdoorsman, had spent his life exploring the region's backcountry—home to the densest population of grizzlies in the Lower 48.

The group of four riders, five horses, and a cattle dog moved slowly along a narrow, steep ridgeline. Vitale, riding lead, suddenly saw a large dark hump in the trail 40 to 50 feet away. It was a grizzly—sound asleep, bedded down in the ridge saddle. Vitale realized he and the others couldn't turn their horses and slip away without a lot of clatter and possible disaster. He quickly decided to dismount and snub the horses to some small Douglas firs on the uphill side of the trail.

"The wind, a crosswind, was in our favor," says Vitale. "I yelled at the bear and woke it from its nap. It sprang up, and two cubs of the year popped up bawling. Just then the dog ran past us straight at the bear, and the horses started freaking out. The bear charged, the dog disappeared above us into the trees and circled around behind us with the bear after it. Now I think, 'We're really in for it, if we're between the sow and her cubs.'"

The grizzly broke off chasing the dog and headed back to her cubs. "Then," Vitale continues, "she came down on all fours and charged right for us."

Fortunately one of the riders, who had run into a grizzly the week before, was carrying a canister of bear pepper spray, a product newly on the market. He passed it to Vitale, who aimed it at the fast-approaching sow. "At 15 or 20 yards I started spraying and just kept spraying," he says. "The bear ran into the big cloud and it stopped her cold—she turned around and took off with the cubs."

There was a little blowback of spray and the four men's eyes stung and watered, but they were alive and unharmed. "I'm a lifelong hunter, and now I always have bear spray right there, real close," Vitale says. "I don't see a big deal to carrying it in a holster on your hip—it's readily available and you can even shoot it from your hip if you have to. As a hunter I feel you have a responsibility not only to protect yourself but also to protect the bears."

Since that incident nearly 20 years ago, bear spray has become increasingly popular among hikers, anglers, hunters, backpackers, outfitters, and others who venture into the backcountry. And, as it did for Vitale and his friends, the powerful spray continues to save lives—of humans and bears. Recent research shows that bear spray is more effective than firearms at deterring attacks. Not that a well-aimed shot from a .44 handgun or large-caliber elk rifle can't deter a charging bear. It can. But studies show that the odds of preventing injury to yourself are far greater when you spray a near-impenetrable cloud of eye-scalding, nose-burning, throat-closing mist that stops a bear in its tracks.

Bear encounters increasing

Across the Northern Rockies, both bear and human populations are on the rise, making bear encounters more frequent. Montana's black bear population stands at roughly 13,000 animals. About 740 grizzly bears live in and around Yellowstone National Park, and another 1,000 or so reside in the Northern Continental Divide Ecosystem between the Canadian border and the Blackfoot River Valley.

According to Chris Servheen, grizzly bear recovery coordinator with the U.S. Fish and Wildlife Service, in 2011 alone there were 83 incidents in the Northern Rockies of grizzlies charging people—31 instances (37 percent) involved hunters and 29 (35 percent) involved hikers. Fourteen (17 percent) resulted in human injuries and two were fatal.

Hunters are especially at risk of an encounter. By stalking quietly, moving at dawn and dusk, traveling off-trail, hunting alone, bugling, cow-calling, using cover scents

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Christine Paige is a wildlife biologist and a writer in Wyoming. A version of this article originally appeared in Bugle.

SHOOT OR SPRAY? In a study of Alaskan bear attacks, firearms stopped bears 77 percent of the time, compared to 90 percent of the time with bear spray. Bears inflicted injuries on humans 56 percent of the time when firearms were used as defense, compared to only 4 percent with spray.

including elk urine, and releasing the aromas of rumen and freshly killed meat, hunters do just about everything "wrong" in bear country. Many hunters are also out during the peak of bear hyperphagia, a condition when the animals pile on the calories in preparation for hibernation. "Bears at that time are amped up and in competition with one another for resources," says Kevin Frey, bear management specialist for Montana Fish, Wildlife & Parks in Bozeman. "If a bear comes upon an elk carcass or gut pile, it's an enormous protein and calorie reward."

Grizzly charges usually involve unexpected encounters or incidents where food is involved. "When you surprise a bear at close range," says Tom Smith, a bear research biologist at Brigham Young University, "the grizzly's response seems to be that the best defense is a good offense."

Hunters have long relied on their firearms as protection against bears. But a recent study of bear encounters by two of the world's top bear-conflict experts shows that bear spray is even more effective. At the Fourth International Human-Bear Conflicts Workshop, held in Missoula in 2012, Smith, bear biologist Stephen Herrero of the University of Calgary, and several co-authors presented their research on the effectiveness of bear spray and firearms in bear encounters.

The researchers first examined records of every bear encounter in Alaska where people had used bear spray to defend themselves—72 cases in all, from 1985 to 2006, including black bears, brown bears/grizzlies, and polar bears. What they found showed that bear spray packed an enormous punch. It stopped undesirable behavior more than 90 percent of the time, and in only three cases were humans injured—all relatively minor injuries—when bear spray was used.

In 13 incidents, bears resumed threatening behavior after the first spraying, but repeated spraying finally deterred the bear so that the person could escape. In three instances, the bears were in full charge when the spray was triggered, and the animal's momentum carried it through the fog. But the spray did dissuade the bear, leaving the victims with only minor lacerations and in no need of hospitalization. "I am almost shocked and amazed at the track record of bear spray," says Herrero, author of the popular *Bear Attacks: Their Causes and Avoidance*.

Easy to miss

Smith and Herrero next studied the effectiveness of firearms in bear encounters. Looking at records of 269 attacks by all three bear species in Alaska that occurred between the late 1800s and 2009, they found that discharging a firearm stopped encounters in 84 percent of incidents for handgun users and 76 percent for long gun users. "That's surprising because some believe that handguns have no place in bear safety," Smith told the *Salt Lake Tribune*. "But they are much more maneuverable and can be carried more accessibly [than a rifle]."

Yet even though firearms can stop attacks, often it's usually only after the bears have caused bodily harm. Smith and Herrero found that bears inflicted injuries on humans in 56 percent of the incidents involving firearms. In fact, there was no difference in the rate of bear-inflicted injuries between those who discharged their firearm and those who didn't, whether that outcome was a fatality, an injury, or no injury at all.

Firearms failed as a defense for a variety of reasons: jamming, an engaged safety, no round in the chamber, the inability of the shooter to reload, the bear being too close, or people stumbling and falling. The most common reason found by the researchers was simply a lack of time to respond.

Smith points out that even an expert marksman can miss a killing shot when a grizzly charges from 10 yards. "It can be combat shooting," says the biologist. "It's easy to miss or, even worse, make a bad hit."

In Alaska, there have been no human

fatalities in encounters where bear spray was used. However, Smith and Herrero recorded 17 human fatalities in cases when firearms were used as defense, whether the victim was killed by the bear or by human partners trying to defend against the attack. In 2011, such a tragedy played out when a hunter in Idaho shot a grizzly, mistaking it for a black bear. After the hunter and his partner tracked the wounded bear into the brush, the grizzly attacked one man and the other fired at the bear to halt the attack—but the bullet killed both his partner and the bear.

"The odds are stacked against you when using a firearm," says Smith. "If you're proficient, you have a good chance of defending yourself. But there are a lot of situations when you're not in a good position to use a firearm, so why wouldn't you carry bear spray? It's another tool in the toolbox."

Why is bear spray so effective? The active ingredient, capsaicin, sends an explosion of irritant that overwhelms a bear's nasal membranes and hotwires its brain from fight to flight. The spray also creates an entire wall of defense—a near-impenetrable cloud the size of an SUV.

In addition to a far better record for human safety, another advantage of bear spray is that it leaves bears alive and healthy. Smith and Herrero found that bears died 61 percent of the time when people used firearms. Many of the encounters involved females with cubs, and a dead sow meant orphaned cubs. No one knows how many of those encounters were bluff charges where the bear would have pulled up short of an actual attack.

The active ingredient, capsaicin, sends an explosion of irritant that overwhelms a bear's nasal membranes and hotwires its brain from fight to flight.

Firing a warning shot may not scare off a bear, because many bears don't associate a loud gunshot with danger to themselves. But a nose full of bear spray is a strong deterrent and teaches a bear that it's a bad idea to mess with people. "Bears learn quickly," says Mike Madel, FWP bear management specialist on the Rocky Mountain Front. "They remember those encounters and experiences."

Explosion of irritant

Remarkably, most bear encounters leave humans unscathed. Usually the bear turns and leaves, trying to avoid the human. When surprised, both grizzlies and black bears often "bluff" charge—rushing forward aggressively but stopping at the last second before contact. "It's how they deal with other species," says Frey. "They're trying to figure out the situation and get you to leave."

Madel agrees: "In most cases grizzly bears are bluff charging—they're trying to push you off, not actually cause injury, which they could easily do." Before the development of bear spray, says Madel, he relied on a shotgun for defense in management work, and he got good at climbing trees. "I started carrying bear spray 12 years ago. It's way easier than using a shotgun." Although the biologist has been charged several times, he has had to use bear spray in only three cases, and each time the spray turned away a charging grizzly.

No two bears are the same—each is an individual personality, each a product of its experiences. Some bears are more tolerant than others, some more timid, some more bold. "The most surprising part, perhaps, is how many encounters there *aren't*," says Frey. "They're pretty tolerant of us, if they've been given a warning that we're there. Bears get to be old bears by being cautious."

Although no deterrent is 100 percent effective, bear spray has racked up an impressive track record for human safety and as a nonlethal deterrent. "Bear spray provides a way to smack 'em without worrying about the aftermath," says Smith. Consider that nature is full of creatures that successfully deploy chemical weapons as self-defense—skunks being the obvious example. With bear spray, you can defend yourself like a skunk does, and both you and the bear will likely walk away—you with a great campfire story, the bear with a great lesson learned.

FWP and other members of the Interagency Grizzly Bear Committee have created a free new brochure, What You Should Know About Bear Spray, *that's available at igbconline.org.*

TAKE A BIG WHIFF Bear spray expels a mass of irritant the size of an SUV. Though wind can make bear spray less effective, the sheer amount of atomized capsaicin (a red pepper derivative) in the air almost always ends up deterring a charging bear.

Disappearing

The amazing ways that animals hide from us and each other. By Ellen Horowitz

RESTING EASY A white-tailed ptarmigan can sleep in peace knowing its white winter plumage disappears in the snow. Occasionally, however, some of these birds can turn white before the snow flies, making them highly visible prey for raptors and other predators.

DONALD M. JONES

The well-used game trails crisscrossing the talus slopes looked promising, so we pulled out our binoculars and began to scan.

After several minutes of methodical searching, my friend Brian announced, "Those rams are humongous!" I didn't see a thing. While quickly setting up a spotting scope, Brian described exactly where the bighorn sheep were standing. Yes, I could see the lower rock ledges. Yes, I could see the thin stringer of small subalpine firs. But no matter how hard I looked, I couldn't spot the six rams. "Take a look through the scope," Brian said. "They're smack in the center."

I peered through the high-powered optics. Still nothing. Just as I began to ask Brian for yet another landmark, a curved shape appeared out of nowhere. The ram turned his head and I saw him. Now that I knew where to look, the other five rams materialized out of the mountainside as if by magic. All this time they had been hiding in plain sight.

Many animals have an extraordinary knack for blending in to their surroundings. For good reason. In a world of eat or be eaten, a prey animal's ability to disappear from a predator's view, or a predator's ability to go undetected by prey, greatly increases its odds of surviving another day.

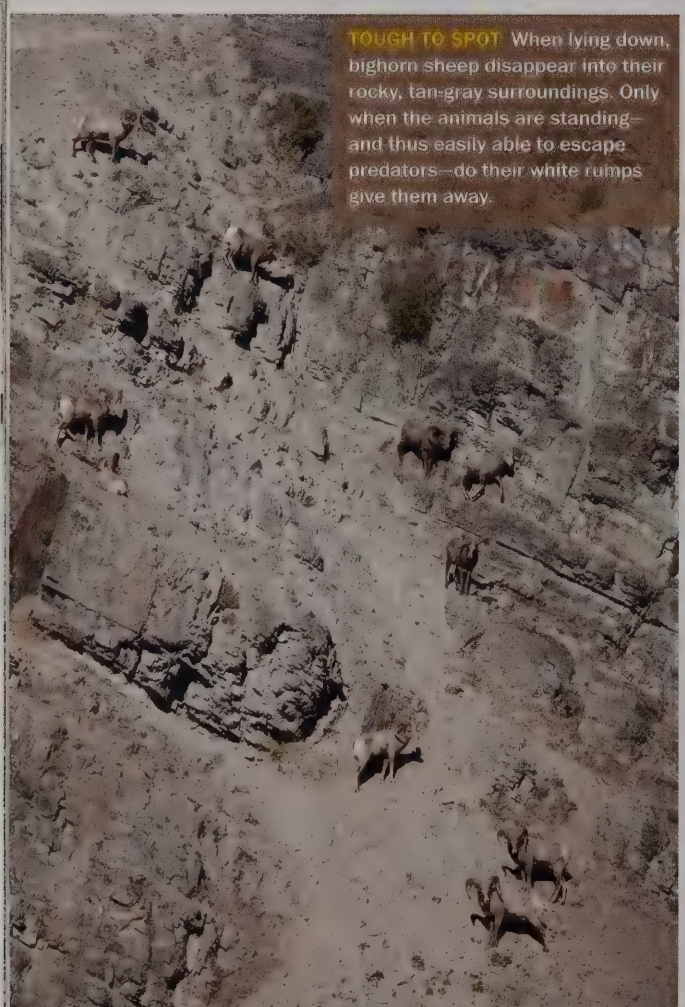
Such a vanishing act is known to scientists as crypsis—the ability or capacity to avoid detection. Commonly it's called camouflage, a generic term covering a variety of forms and strategies that maximize concealment.

Cryptic coloration is the term for colors and patterns that prevent detection. One example is a prairie rattlesnake's body color—tan to light brown or greenish—adorned with dark brownish splotches that help the reptile hide in dried grasses and rocky soil. Another is the mottled plumage of a spruce grouse, which allows the bird to disappear into conifer shadows and tree bark where it often roosts. And let's not forget human bowhunters, waterfowlers, and photographers, who wear camo clothing patterned as marsh grass, oak leaves, sagebrush, snowy ground, aspen bark, and more.

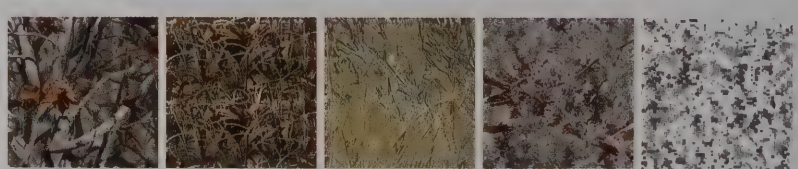
Many cryptically colored creatures instinctively freeze at the first sign of danger. That lack of motion makes the animals even harder to see, as I discovered one day in early June when I unintentionally stood within 5 feet of a few-days-old fawn. She lay perfectly still, the light spots on her dark fur mimicking the dappled light filtering through the treetops onto the forest floor. I'm unsure what small detail alerted me to her presence. Did I see a tiny black hoof? Did she twitch an ear? Finding her became the highlight of my day, but it also made me wonder how often I look at or walk past an animal without ever seeing it.

That's no doubt the case with many ground-nesting birds I pass by without notice. Species such as snipe, sharp-tailed grouse, and various sparrows have brown, tan, gray, and white feathers that match rocky or sparsely vegetated backgrounds. When on the ground, the common nighthawk's mottled and barred plumage dissolves into the surroundings. When not flying, the bird often squints its large, dark eyes, making it less conspicuous.

Owls are experts at disappearing acts, thanks to both cryptic coloring and shape shifting. Variegated, earth-toned plumage patterns help these camouflage wizards resemble backdrops of tree bark, shadows, and light streaming through branches. According to Denver Holt, president of the Owl Research Institute in Charlo, some owls actually alter their shape when threatened. "They elongate their bodies, twisting sideways, then raising and drawing a wing across the side of their bodies," he says, to make themselves look less like an owl and more like the tree trunk. Holt adds that some owls erect the feathers of their facial disk to distort the



TOUGH TO SPOT When lying down, bighorn sheep disappear into their rocky, tan-gray surroundings. Only when the animals are standing—and thus easily able to escape predators—do their white rumps give them away.



And let's not forget human bowhunters, waterfowlers, and photographers, who wear camo clothing patterned as marsh grass, oak leaves, sagebrush, snowy

LEFT TO RIGHT: DONALD M. JONES; SHUTTERSTOCK; JAIME & LISA JOHNSON; FRANCIS C. BERGQUIST

PLANT LIFE Owls sometimes alter the shape of their bodies by twisting sideways or drawing a wing across themselves to look more like bark. By squinting, they hide their large, distinctive eyes, and their feathered "ear" tuffs resemble branch stumps. The American bittern's striped plumage resembles the cattails and bulrushes where the bird lives. On windy days, bitterns will actually sway back and forth to mimic reed movement.

Where's wildlife? Many animals are masters of disguise

KILLDEER
Common shorebirds, killdeer lay their spotted eggs without a nest on the ground amid small stones. Upon hatching, the mottled chicks, round in shape and without movement, look like rocks or leaf litter.

SPINY SOFTSHELL TURTLE
This eastern Montana reptile has a soft, flat, leathery shell that looks like silt or a small boulder. The soft shell makes the turtle vulnerable to predators, so it spends much time buried in the mud of lake bottoms.

MULE DEER
The white spots on deer fawns and elk calves resemble the mottled sunlight streaming through trees or shrubs under which the young animals hide during their first few weeks before gaining enough strength to run from danger.

COMMON GRAY MOTH
Like many moths in the Geometridae family, the common gray blends perfectly against tree bark. The insect holds its wings flat against the surface so that no shadow forms, adding to the camouflage effect.

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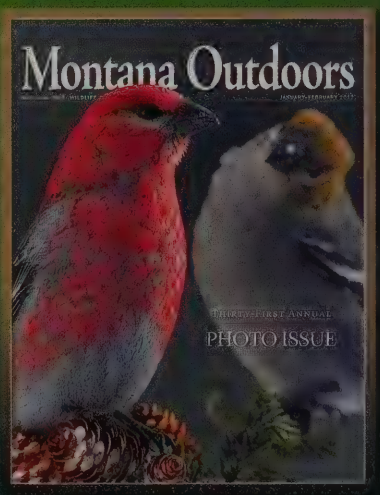

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shape of the birds' characteristic large head, thus making them less conspicuous.

Staying still is usually a great way to remain hidden, but not always. Some animals incorporate movement with body shape alterations and cryptic coloration to mimic the surrounding vegetation. The American bittern resembles the rushes and cattails where it lives by pointing its bill skyward, contracting its feathers to narrow its body profile, and standing as tall as possible. Aiding concealment are vertical streaks on the bird's throat and breast feathers. On windy days, the bittern gently sways back and forth, imitating the plants' movements. "We were within a dozen yards...yet if our eyes were turned away for an instant it was with difficulty that we could pick up the image again, so perfectly did it blend with the surrounding flags [cattails] and so accurate was the imitation of their waving motion," wrote the early 20th-century ornithologist Arthur Cleveland Bent in *Life Histories of North American Marsh Birds*.

Another illusionist is the greater short-horned lizard, found in dry, open native prairie. The reptile's base colors—from tan-gray to reddish-brown to olive green-gray—match the soil of its home turf. Dark splotches and light spots conceal it further, while spines and fringes of scales help break up its outline. When a greater short-horned lizard holds still—awaiting prey or avoiding predators—it fades from sight as if absorbed into the earth.

Countershading, an effective and subtle component of camouflage, is exhibited by such diverse animals as field mice, mountain lions, ruby-crowned kinglets, and west-slope cutthroat trout. The backs of these and other countershaded animals are darker than their undersides. Ordinarily, an animal illuminated by sunlight is lighter on top and darker below. A countershaded animal's dark top and light bottom counter the effects of natural lighting to create a more uniformly gray form that looks less like a three-dimensional animal and more like a flat, indistinct image.

Many animals that spend time both on and above ground benefit from countershading when viewed from different perspectives. For example, when observed from above by a Cooper's hawk, the back of a red squirrel blends in with the dark forest floor. The same squirrel, when high in a tree and seen from below by a pine marten, displays a light underside that merges with the bright sky, reducing its outline to the predator.

Seasonal dimorphism is a type of camouflage in which the animal actually changes the color of its pelage (mammals) or plumage (birds) to blend in with the seasonal surroundings. In Montana, weasels, snowshoe hares, white-tailed jackrabbits, and white-tailed ptarmigan change from various shades of brown and gray in summer to white (or mostly white) in winter by molting and growing new fur or feathers. During winter I regularly see snowshoe hare tracks along snowy forest edges. But trying to find this large-footed, long-eared creature is like looking for a ghost. On more than one occasion I've been startled by a snowshoe hare launching itself from the base of a nearby tree where it had remained hidden from my view.

Sometimes, dramatic seasonal changes in coloration can backfire. While hiking along the Rocky Mountain Front one day in late September, I spotted the carcass of a

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Ellen Horowitz of Columbia Falls is a long-time contributor to Montana Outdoors.

CLOCKWISE FROM TOP LEFT: KRISTI PEMBROKE; NATHAN COOPER; JEREMIE HOLLMAN; NEAL & MJ MISHLER; TOM ULRICH; MICHAEL H. FRANCIS

WHITE-TAILED JACKRABBIT
Like the snowshoe hare and white-tailed ptarmigan, the white-tailed jackrabbit displays seasonal dimorphism, meaning it changes its pelage (mammals) or plumage (birds) twice each year to blend in to seasonal surroundings.

CADDIS FLY PUPA
The pupa of the caddis fly builds a protective casing of pebbles, tiny twigs, and other stream bottom materials, allowing the insect to blend in to its natural surroundings before emerging as an adult that can flee fish predators by flying.

white-tailed ptarmigan. Snow had yet to arrive, but the bird had already turned white and must have stood out like a neon sign announcing, "Food: Eat Here." The pile of white feathers on the dark tundra indicated that a predator had taken advantage of the highly visible meal.

Some animals change colors to match their surroundings, the chameleon being the most famous. In Montana, grasshopper nymphs change from spring-green to sun-bleached shades of golden brown each time they molt. The new colors match changing plant colors throughout the season. A crab spider changes color to mimic the petals of various flower species where it awaits its next meal. Over two to three days, the spider can slowly change from bright yellow to white with pink slashes. When a bee, fly, or butterfly alights on a petal, the spider pounces.

Many caddis fly species build protective cases made from tiny pebbles, tree needles, or other underwater materials. When tucked inside its case, the larva blends into the stream bottom instead of standing out as a menu item. The wings of some Montana butterflies such as anglewings (commas) are adorned with colorful upper surfaces but have muted gray and brown undersides. When closed, the wings match hues and designs found on dried leaves or tree trunks. Many moths have bark-colored wings that, when held flat against a tree, project no shadows and perfectly mimic the background. The newly hatched larvae of swallowtail butterflies and some moth species appear to be bird droppings—convincing would-be predators to look elsewhere for supper.

Some animals disguise themselves by resembling a harmful species. When the nonpoisonous bull snake rapidly vibrates its tail in dried grasses, the sound is similar to that of a prairie rattlesnake. The harmless viceroy butterfly dupes predators by looking like the inedible monarch butterfly. Some nonstinging insects such as the syrphid fly (hoverfly) are adorned with yellow and black stripes to resemble bees.

Most animals fool onlookers by using colors, patterns, or imitations of undesirable creatures or objects. For them, hiding in plain sight means survival and (ultimately) perpetuation of the species. So don't despair the next time you go looking for wildlife and don't see any. Plenty of camouflaged critters are right there, in plain sight, most likely watching you.

For many animals, hiding in plain sight means survival and (ultimately) perpetuation of the species.

CLOCKWISE FROM TOP LEFT: STEVEN GNAM; STEVE MITCHELL; DAVID ANDERSON; JESSE LEE VARNADO

COMMON NIGHTHAWK
Colored in gray, white, buff, and black, the nighthawk disappears when perched on trees, bark, and ground. As do owls, the bird often squints to hide its large dark eyes when not flying.

CRAB SPIDER
The king of camo may be the crab spider, which can change color like a chameleon to mimic the petals of different flowers. There it awaits bees, flies, or butterflies looking for pollen but finding instead a colorful killer.

BARK BIRDS Tanner in color than the mottled blue-gray male, the female dusky (blue) grouse blends in perfectly against the trunk of a ponderosa pine. Only their dark eyes give this pair away.

Garters in the Garden

By Bruce Auchly

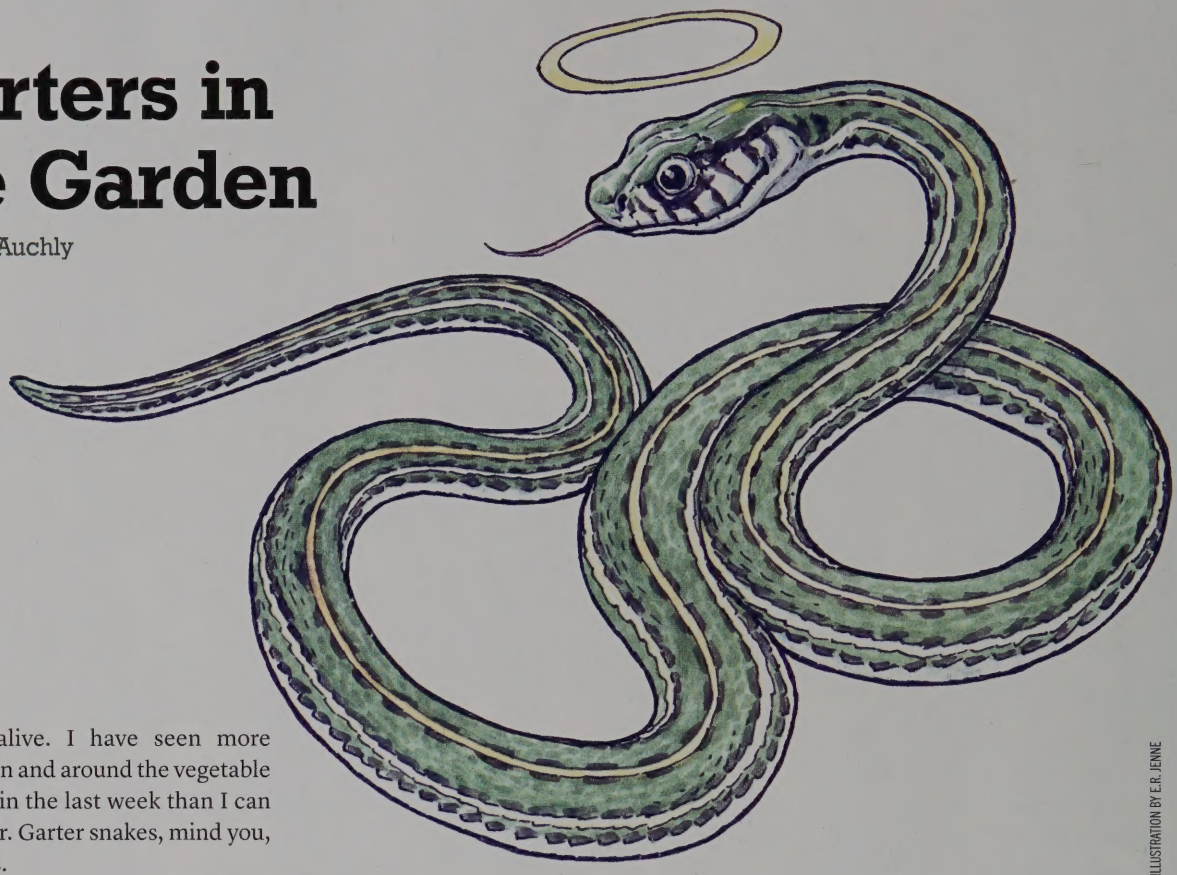


ILLUSTRATION BY E.R. JENNE

Snakes alive. I have seen more snakes in and around the vegetable garden in the last week than I can ever remember. Garter snakes, mind you, but still snakes.

Snakes. The very word can make grown men shudder and women and children run for cover.

That's too bad, though to a certain extent understandable. To some people there is something repulsive about an animal that slithers along the ground, unseen in tall grass.

And then there's that whole Adam and Eve in the Garden thing. Didn't that story end with no paradise on this planet for humans, and snakes condemned to crawl on their belly eating dust? Yuck.

Here's the good news: Snakes are among a gardener's best friends. Really.

Garter snakes will eat nearly anything. Near water, that means frogs, tadpoles, and fish. In my garden their menu runs to grasshoppers, beetles, and small mammals—all pests I would gladly be rid of.

Montana hosts three species of garter snakes: common, terrestrial, and plains. The terrestrial and common are generally found west of a line running from about Billings to Shelby, and the plains lives mainly east of that line. All three have stripes that run the length of the body. Apparently they resembled garters when garters were in style.

The terrestrial garter often, though not always, has three yellow stripes running the length of its body with a series of black spots between and on the stripes. If it hunts in my garden, however, I haven't seen it.

My visitors are mostly plains garter snakes with the occasional common. Plains garter snakes are the easiest to identify. They have an orange or brick-red stripe running down their back flanked by greenish-yellow stripes down each side.

Plains garter snakes can run up to 3 feet long. I've found none that big, but 24-plus inches, yes.

Common garter snakes have three yellow longitudinal stripes. They can grow to 40 inches. That's a big garter snake.

While garter snakes are ridding pests in the garden, the reptiles have their own predators. Raptors will drop from the sky like a bolt of lightning and snatch one up in its talons.

Of course, not everyone is a snake lover, or even tolerates the reptiles. If that's your mindset and you want to rid them from your property, then remove what makes snakes comfortable. In summer, snakes escape heat in shady cover like under a pile of old boards or a junk car, or in tall grass. Clean up the lot, mow the grass short, and any snakes will likely disappear.

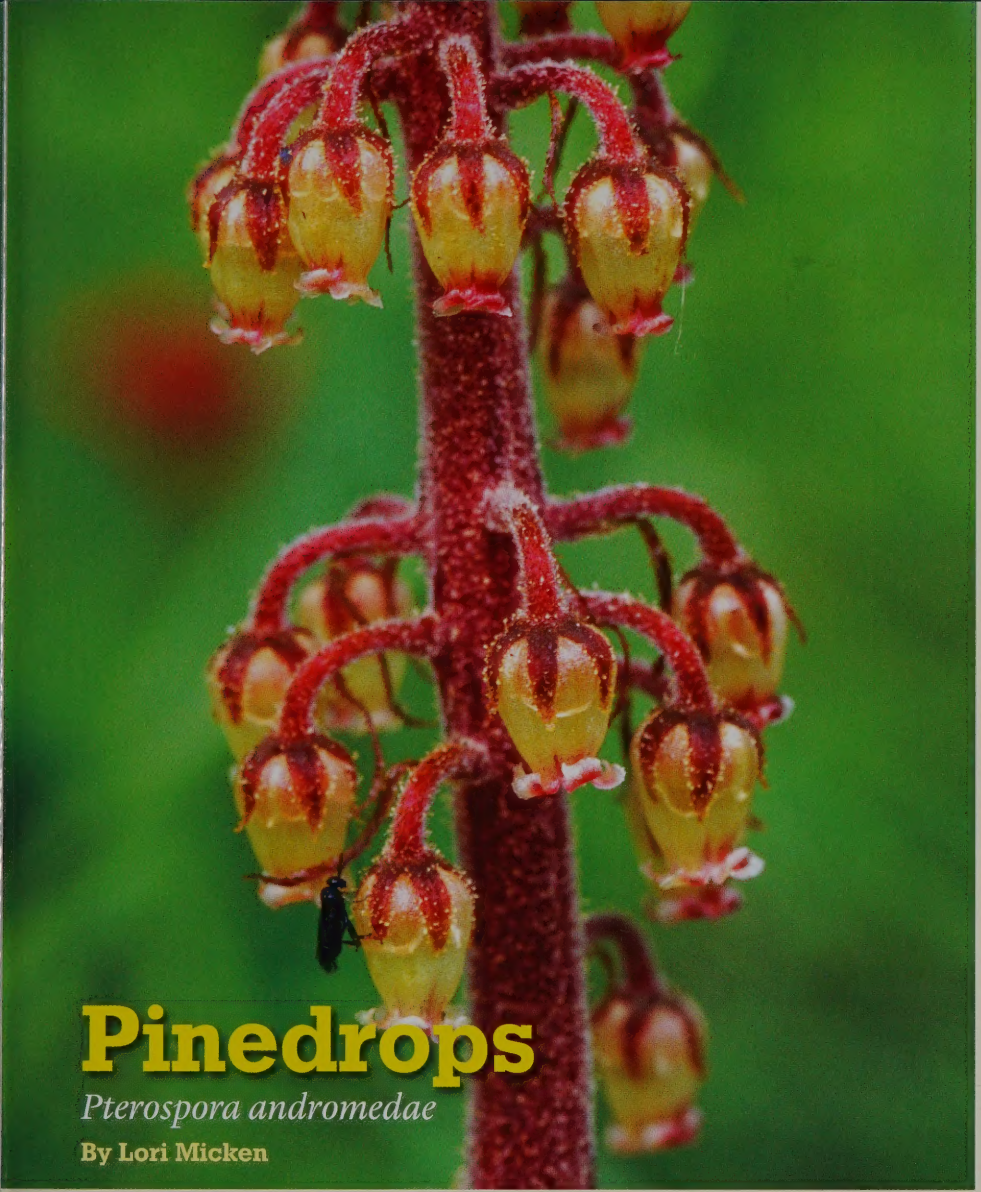
Oh yes, pigs are death on snakes. So maybe buy a pig.

But really, snakes can be our friends, even rattlesnakes, which are wonderful mousers. A rattlesnake in the field, across the road, eating mice? I'm fine with that.

But not in the front yard by the house. That has happened. One time I scooped the rattler up with a shovel, put it in a cooler, and took it down the road to a rocky cliff, where I released it to slither another day.

Then again, another time I had to send a rattler in my yard to snake heaven.

Bruce Auchly manages the FWP regional Information and Education Program in Great Falls.



Pinedrops

Pterospora andromedae

By Lori Micken

One day while hiking in a coniferous forest in northwestern Montana, I came across some strange, tall plants. They looked like stout, reddish-brown "sticks," and stood out against the green underbrush. At first I thought they were dead saplings, but the tops were ornate, with dozens of yellowish balls hanging on curved brown stalks, looking like old-fashioned streetlights.

I later learned that what I'd seen were pinedrops, one of the strangest plants in all of Montana.

Classification

Though pinedrops are a flowering plant, they have almost no chlorophyll, instead obtaining their food from dead plant material. Pinedrops are in the Monotropaceae family, along with two other saprophytes (plants living off dead plant material): indian-pipe and pinesap. So abnormal are pinedrops that some botanists have also put them in the Wintergreen and Heath families.

Description

Since that first encounter, I have seen many pinedrops. The plants generally grow from 1 to 4 feet tall, though I have seen them up to 5 feet (at my eye level). Those were like encountering creatures from another planet. The unbranched stems, rose to brick-red colored, are sticky and hairy. The leaves are reduced to narrow, brown scales on the lower stem. The cream-colored balls are actually flowers, which look like inverted vases. The five-pointed sepals appear to be clutching the flowers and seedpods like claws.

Scientific name

Pterospora means winged seed, referring to the narrow flaps of tissue on the sides of the seeds. ***Andromedae*** refers to the Greek story of the princess Andromeda, who was rescued from a sea monster by the hero Perseus. The plant reminded the Swedish scientist Carl Linnaeus, who named it, of a princess standing on a rock by the sea.

Reproduction

A hand lens is required to see the beautiful pale yellowish petals tipped in light pink, ¼ to ⅜ inch long. The petals almost completely close over the reproductive parts. Only the knoblike yellow stigma on a heavy style (the upper part of the female pistil, or ovary) shows. A cluster of ten tiny stamens folds across the nearly round pistil. These sit below the stigma, so the plant probably can't self-pollinate.

Pinedrops flower from June to August, depending on elevation. In late summer tiny, pollen-sized seeds form in the ovaries. Only the wing of the seed can be seen with the naked eye.

Range

Pinedrops are found from British Columbia and Alberta south to California, and from Alaska to Labrador then south to Pennsylvania and Michigan. They grow in coniferous forests that have abundant decaying plant material, at elevations up to 8,500 feet. They are considered threatened or endangered in some eastern states.

Ecological function

Pinedrops take part in the final breakdown of nutrients in soil. The fleshy roots grow in irregular masses that obtain nutrients from soil fungi, which obtain their nutrients from tree roots. Technically, pinedrops are parasites on the fungi they feed on, rather than true saprophytes. Stalks do not grow from the roots every year, but several may emerge from the same mass at the same time.

I once observed a bumblebee hanging from the tip of a flower, gathering pollen and nectar. Other insects also probably pollinate the flowers. I've seen no insect or other parasite damage on any of the pinedrops I've observed, probably because of the sticky-hairy nature of the plant.

Lori Micken, a retired high school biology teacher, is a writer who lives near Livingston.

STEVEN AKRE

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PARTING SHOT

BIRD OR BOULDER? A green-winged teal avoids detection from predators by resembling river rocks in shallow water. See how other animals have evolved to hide from predators on page 32. Photo by Nelson Kenter.

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